



FRIDAY, MARCH 7, 1879.

Sheffield's Three-Wheeled Hand-Car.

Although our readers will laugh at the funny contrivance which is illustrated on another page, and which was constructed by a Pennsylvania school-master, yet it had in it the same idea that has been worked out very successfully by a Michigan mechanic, and which is illustrated by the engraving herewith of a very neat, convenient and effective three-wheeled hand-car, of which the maker sends us the following description:

"It is a three-wheeled vehicle, and the smallest of the wheels is placed at one end of a bar that is fastened to or taken from the main part at pleasure, and rests upon the left-hand rail to keep the vehicle upright and upon the track. The other two wheels, of which that in the rear is the largest, rest upon the right-hand rail, and over them is built a frame work that answers for a seat and carrying place. The power is applied from a lever in front, worked by hand alone or hand and foot, and connected with two cog-wheels which act on cogs in the shaft of the hindmost wheel upon the track. The whole is put together in a very neat and substantial shape, and nicely finished. They are used by railroad officials in repairing telegraph lines, measuring wood, and various kinds of light work, and going twelve miles an hour without any extra effort. The Michigan Central, Lake Shore & Michigan Southern, Michigan Lake Shore, Port Huron, Grand Rapids & Indiana and Lawton & Paw Paw railroads use them, the last named to carry the mail on the narrow-gauge road between those two places. Mr. S. lately sent one on an order for three from the Chicago, Alton & St. Louis Railway, and expects an order for five from the Canada Southern."

We regret that we are unable to give the weight of the car, as it is one of the lightest hand-cars ever built. It is very neatly designed, and does much credit to the skill of the maker, who is Mr. G. S. Sheffield, of Three Rivers, Mich.

Contributions.

Thou Shalt Not Drink!

LA FAYETTE, Ind., Feb. 27, 1879.
TO THE EDITOR OF THE RAILROAD GAZETTE:

Some days ago the following pronunciamento was evolved from out the seigneurial consciousness of a railroad superintendent, not unknown in "Ye Garden City," viz.:

"Hereafter no person habitually making use of intoxicating liquors will be employed by this company in any capacity, and any such person now employed is requested to quit without waiting for discharge.

"Being intoxicated while off duty, habitually visiting drinking saloons, or selecting such places for board will be deemed sufficient evidence of intemperate habits and will be followed by immediate dismissal.

"(Signed) _____, Gen'l Supt."

Will some kindly disposed and loquacious votary of petty tyranny please rise and explain to an unsophisticated skeptic like myself by what authority even a railroad superintendent presumes to trespass upon the rights of those whom the caprice of chance has placed under his incontestable thumb?

While not an advocate of intemperance in the slightest degree, and freely admitting the evil consequences which follow the excessive indulgence in alcoholic drinks, yet intemperance does not wholly consist of stimulating beverages but of going to an unreasonable extreme in anything. Query: Is not the promulgating of our impudent "superintendent" a very well-defined evidence of the very evil he has essayed to squelch with his unequivocal anathema?

If it is entirely the just and proper thing to do, then why not proscribe a little more at length and determine by a further manifesto precisely what his employés shall or shall not do while "off duty;" issue, as it were, a moral code of rules and regulations (inviolate of course), whereby it shall be definitely declared, as for instance: Into the contribution box of what denomination they shall, upon pain of dismissal, drop their surplus "shiners" and suspender buttons, for the benefit of the "poor heathen abroad" or more properly, the sleek hypocrite at home. And further, from whom ill-paid employés may and may not steal in order to supply the necessities of life to those who may be dependent upon them for its common requisites. How often is it permissible for the festive clerk or other unmated employé who goes to make up the category of boarding-house birds (the migratory species) to test the strength of a clothes line or other convenient cord by lowering his "grip-sack" from some near window as a matter of economy, etc., *ad infinitum*.

To the personally disinterested and irreverent mortal like myself there is a peculiarly odious savor of bigotry in the above order, and hence this communication in the hope that

it may elicit an elucidation of the justness (if there is any) which may hedge within the article in question.

Will some defender of pseudo-authoritativeness please pull on his tin pants, i. e., armor, and enter the tourney with either an indisputable argument or a partial palliation.

Rox.

The Steam-Ports of the Boston & Albany Locomotive.

ALBANY, March 3, 1879.

TO THE EDITOR OF THE RAILROAD GAZETTE:

May not the explanation of the increased economy claimed by "Springfield" as the result of shortening the ports of the "Brown" four inches be as follows?

The ports of a passenger locomotive intended for high speeds are made much longer and wider than would be necessary at lower speeds to admit steam of boiler pressure to the cylinders. Now, a freight locomotive like the "Brown," although it has smaller drivers, is usually run at a lower piston speed than a passenger engine, being used to haul heavy loads slowly. Consequently the ports might be made shorter without wire-drawing the steam injuriously, the valve nar-

ments of arriving at the resistance, and considers a 10° curve equal, with a train of empty cars, to a 60-ft. grade, and, with a train of loaded cars, equal to a 41-ft. grade, which equals nearly 23 lbs. per ton for train of empties, and 15½ lbs. per ton for train of loads, making between three and five times the resistance caused by curvature that you state.

There is an old, but unscientific, rule, that considers every degree of curvature as equal to 5 ft. per mile grade, which would make the 10° curve almost equal to a one-per-cent. grade, and give a result about half-way between Mr. Wellington's trains of empties and loads, and, if his figures are correct, would be a fair approximation. As the curves on main lines do not generally, I think, exceed 3°, the equal grades for light curvature would be of more general utility. Mr. Wellington calculates a 3° curve as equal to a 20-ft. grade for light, and about 13-ft. grade for loaded train, or a little more than you allow for a 10° curve, and a medium of which would make a degree of curvature equal in resistance to a 5½-ft. grade.

It would be of value to the men who handle trains to have some general rule to estimate the resistance caused by curves, which, while it need not be scientifically exact, would be close enough to work safely by, and enable trains to be loaded properly. I am satisfied that, if the curve resistance you give is correct, a great majority are over-estimating it, and if not correct, it will mislead a great many in the business, who generally accept what you say as authority. B.

ST. LOUIS, Mo., Feb. 6, 1879.

[In reply to our correspondent it must be said that the testimony regarding this subject is not in a very satisfactory condition. A new and thorough series of experiments is very much needed. The best summing up of the existing knowledge that we know of is contained in the remarks of Mr. O. Chanute is published in the *Transactions* of the American Society of Civil Engineers for April, 1878, during a discussion of a paper on "Theoretical Resistances of Railroad Curves," by Mr. S. Whinery, C. E. We therefore reprint Mr. Chanute's remarks entire this week.—EDITOR RAILROAD GAZETTE.]

Momentum and Energy.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Is there not an error in principle contained in the following sentence on the third column of page 31 of your journal of Jan. 17, 1879? Suppose that "this train weighing 300,000 lbs. is running at a speed of 45 miles an hour, which would be equal to 66 ft. per second. The height of fall or ascent corresponding to this velocity would be 67.6 ft. Consequently the amount of momentum or energy

stored up in the train at that speed would be $300,000 \times 67.6 = 20,280,000$ foot-pounds."

Now momentum is measured by multiplying weight by velocity; not by the height through which a body would have to fall in order to acquire said velocity. Therefore the actual momentum would be $300,000 \times 66 = 19,800,000$ foot-pounds. If the train were to jump vertically it would (theoretically) rise to the height of 67.6 ft.

I infer from the general character of the article that the writer of it has merely made one of those slips of the pen to which we are all liable, and especially so when writing on subjects with which we are familiar. G.

[The error in the extract quoted above consists in having used the terms *momentum* and *energy* as synonymous when they are not. Momentum, as our correspondent points out, is measured by the "weight multiplied by the velocity," whereas the energy of a moving body, or its capacity for doing work, is represented by the expression

$$\frac{w v^2}{g}$$

in which *w* equals the weight, *v* the velocity in feet per second, and *g* the velocity in feet that a body will acquire in falling one second, and equals 32.2. In other words, if we multiply the weight by the square of the velocity and divide by 32.2, it will give the energy contained in a moving body, or the number of foot-pounds of work which it is capable of doing, which is equal to the "height through which a body would have to fall in order to acquire said velocity," but which is not the same as the momentum.—EDITOR RAILROAD GAZETTE.]



THREE-WHEELED HAND-CAR:

By G. S. SHEFFIELD, THREE RIVERS, Mich.

rowed, its area reduced, and therefore the power and consumption of coal necessary to move it on the valve-seat diminished. Furthermore, the ports of the passenger engine have to be made long to get sufficient opening when the steam is cut off short and the valve travel lessened, whereas the freight engine usually works steam through a greater part of the stroke, with a longer valve travel and a wider port opening.

It would seem that these points have been disregarded by most builders, as it is customary to make the ports about the same length for the same capacity of cylinder, whether for passenger or freight service.

C. L. P.

The Measure of Curve Resistance.

TO THE EDITOR OF THE RAILROAD GAZETTE:
In your recent article on the "Freight Locomotive of the Future," in the course of your remarks about resistance to be overcome, you say the resistance of a 10° curve is about 5 lbs. per ton.

I have so long regarded the resistance from curvature as so much greater than you say, that it would be valuable information to me, and I think of interest to a large class of your readers, to know how you arrive at that result.

The resistance given is one-quarter of one per cent., or the equivalent of the grade resistance on tangent of a 13.2-ft. grade, which, if the resistance was proportional to the curvature, would make the resistance of a 1° curve equal to tangent grade of 1.32 ft.; but if the resistance is less in proportion for easy curves than for sharp ones, it would bring down the equal grade to about 1 ft. per mile.

Mr. Wellington, in equalizing grades with curves in the *Gazette* for March, 1877, arrives at materially different results; he calculates the length of the train as one of the ele-

An I-cycle.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Thinking it might be of interest to you, I inclose herewith photograph and description (taken from *Lewistown Sentinel*, Nov. 14, 1878), a new "speeder" which was captured on the Sunbury & Lewistown Railway last November.

The machine is decidedly unique, and yet you may remember that in Hans Breitmann's (Chas. G. Leland's) ballads we find a hero, one Herr Schnitzerl, who was immortalized by a velocipede of the same kind, although not intended for railroad purposes, and whose tragic fate is duly set forth in the poem.

Little did Breitmann think that it was reserved for a Snyder County citizen to make good in 1878 the prophecy of 1868.

In its present shape the velocipede will not run through frogs or road-crossings, and if one should attempt to do so at the high rate of speed attainable, he would find himself, as Breitmann did (on his first public exhibition after the "ghost of Schnitzerl" had given him the secret of "Dat crate philosophope"),

"Und like an apple vrom a switch
Afat Hans Breitmann vent."

his velocipede having, when at highest speed, unfortunately caught upon "pranch gepept."

I understand that Mr. Kaempfer is making some changes, and that he has applied for a patent. D. B. R.

(From the *Democratic Sentinel*, of Lewistown, Pa., Nov. 14, 1878.)

"AN I-CYCLE—*The Latest from Snyder County*.—When velocipedes were in vogue those with three wheels were termed tricycles, with two wheels bicycles, and it was a standing joke to predict one-wheeled vehicles and style them as in our heading. Several elaborate attempts have been noticed in the papers, but all were expensive and practically useless, until at last one of our sister county's geniuses has accomplished the task, and at a cost of simply a few pieces of board and scraps of iron, such as may be picked up about any barnyard.

The inventor is Mr. J. O. Kaempfer, living near Adamsburg, who, having obtained the position of teacher at the McClure school, designed the machine to transport himself

Und ven he vant to shart id off,
He paddled mit his veet;
And soon he eot to go so vast
Dot every dings he peat.
He run her out on Broader shtreed,
He shkeeted like der vind,
Hei! how he basse de vancy crabs,
And lef dem all behind!

De vellers mit de trottin nags
Pooled oop to see him bass;
De Deutschers all estauished saidit:
"Potztausend! Was ist das?"
Boot vaster shill der Schnitzerl flewed
On—mit a gashty smile;
He tidoon't tooch de dirt, py shings!
Not vonce in half a mile.

Oh, vot ish all dis earthly pliss?
Oh, vot ish man's soocksess?
Oh, vot ish various kinds of dings?
Und vat ish habbiness?
Ve find a pank-node in de shtreed,
Next dings der pank is peak;
Ve falls, und knobs our outsides in,
Ven ve a ten-shrike make.

So vas it mit der Schnitzerlein
On his philosophope;
His feet both shliped outsideward shooth
When at his extra shpeed,
He felled oopon der wheel of course;
De wheel like blitzen fliw,
Und Schnitzerl he vas schnitz in vact,
For id shlished him grod in two.

Und as for his philosophope,
Id cot so shikared, men say,
It pounded onward till it vent
Ganz teufelowards afay.
Boot where ish now de Schnitzerl's soul?
Vhere dos his shibbit pide?
In himmel, troo de endless plie,
It takes a medear ride.

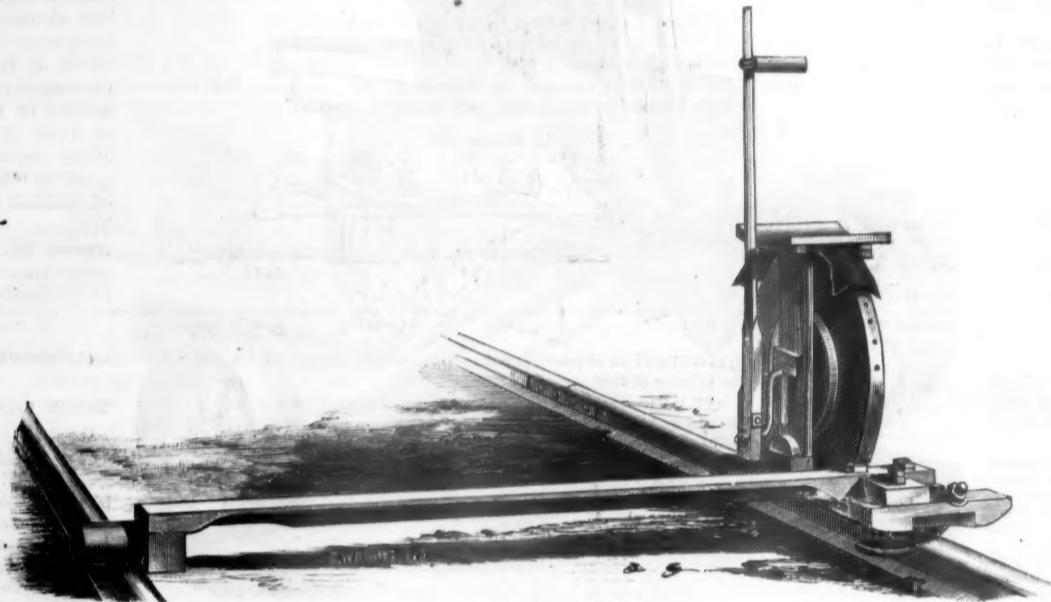
Iron Cars—Are They More Economical Than Wooden Ones?

TO THE EDITOR OF THE RAILROAD GAZETTE:

A recent editorial in the *Railroad Gazette* points to the fact, that while the subject of construction of iron cars has of late prominently occupied the attention of car-builders and engineers, the vital question of economy resulting from their substitution for wooden ones has not had that share in

ITEM.	1872.	1873.
Total cost of freight transportation	\$11,531,015.68	\$12,795,541.87
Number of tons of 2,000 lbs. of freight carried	4,303,605	5,622,724
Freight haulage in mile-tons, i. e., number of tons of freight carried one mile	1,020,908,885	1,246,650,063
Number of miles run by freight trains	7,911,257	9,666,344
Average weight of freight trains, exclusive of freight	250	250
Train haulage in mile-tons, i. e., number of tons of trains (exclusive of freight) carried 1 mile	1,977,814,250	2,416,583,000
Total haulage in mile-tons	2,098,723,135	3,063,233,063
Ratio of paying load to dead load	34 : 66	34 : 66
Number of freight cars (on 8-wheel basis—average weight, 10 tons)	10,983	13,745
Car mileage per car	15,000	14,768
Average car-loads (tonnage per car mile)	6.14	6.14
Cost of repairs of freight cars (average per car)	\$86.04	\$90.00

ITEM.	1874.	1875.
Total cost of freight transportation	\$13,092,877.48	\$12,639,004.85
Number of tons of 2,000 lbs. of freight carried	6,114,678	6,001,954
Freight haulage in mile-tons, i. e., number of tons of freight carried one mile	1,391,560,707	1,404,008,029
Number of miles run by freight trains	9,981,040	8,457,816
Average weight of freight trains, exclusive of freight	250	400
Train haulage in mile-tons, i. e., number of tons of trains (exclusive of freight) carried 1 mile	2,495,260,000	3,383,120,000
Total haulage in mile-tons	3,896,820,707	4,787,134,429
Ratio of paying load to dead load	35 : 65	29 : 71
Number of freight cars (on 8-wheel basis—average weight, 10 tons)	14,736	14,597
Car mileage per car	14,224	20,964
Average car-loads (tonnage per car mile)	6.64	4.58
Cost of repairs of freight cars (average per car)	\$106.21	\$127.19



AN "I-CYCLE!"

By a Pennsylvania Schoolmaster.

from his home to the school and back on the railroad track, a distance of five miles each way.

The driving-wheel is of one inch board and 20 in. in diameter, running in a slot cut through a piece of board that just clears the track. Two pieces of board support a small seat right over the wheel and serve to carry the axle of the wheel with a crank on the inner end. A small roller in the board steadies it frontways, and a stick across to the other rail, terminating in another roller, sideways. A wooden pitman connected to the crank, playing between the operator's legs, is the means of propulsion. The weight as it stands on the rail is 28 lbs. An average speed of six miles per hour could easily be maintained, and in places as high as ten, perhaps twelve miles per hour, could be attained.

The owner running it on the road without permission, and several times nearly at the cost of his life, on account of the uncertainty of the extra trains, Supt. Edward B. Taylor was obliged to order its capture. Crude and rough as it is, it does remarkably well, and shows lots of mother wit for the owner."

The large driving-wheel had a leather strap nailed to its periphery to increase the adhesion. The handle was fastened to the crank by a strip bolted on one side, and motion was produced by raising and lowering the handle like an old-fashioned churn. The machine was held on the track by a horizontal wheel on the inside of the rail (shown on the right side of engraving) and a peg on the outside of the same rail. A roller was attached to the end of the arm, which rested on the opposite rail.

This comical machine must have been constructed by its author after reading Hans Breitmann's celebrated epic, which we give in full.

"SCHNITZERL'S PHILOSOPEDE."

Herr Schnitzerl make a philosopede,
Von de pullyest kind;
It went mitout a wheel in front.
And hadn't none pehnt.
Von wheel vas in de mittel, dough.
And it went sure as ecks;
For he shtraddled on de axle-dree,
Mit de wheel between his leeks.

the discussion of the subject which its importance deserves.

Leaving out all questions as to the principles involved in iron-car construction, and the mechanical difficulties to be overcome—as not pertinent to the question of economy—it is proposed to deal here with this latter only.

Diminution of weights combined with increased strength and carrying capacity are the paramount object of every designer of iron cars. This object once attained in the construction of an iron car which, with the same general dimensions as a wooden one, shall weigh on an average 10 per cent. less than the latter, and have a carrying capacity of 20 net tons, it remains to be shown, how the substitution of iron cars for wooden ones would effect any saving in the cost of transportation, and what the amount of this saving would be.

In order to remove the subject as much as possible from the realm of hypothesis, only such conclusions should be drawn as are borne out by existing facts and given figures.

For this purpose the subjoined table has been compiled; it is based entirely upon data taken from seven consecutive reports made by the New York Central & Hudson River Railroad Company to the State Engineer.

An analysis of the figures in the above table points to the following facts, viz.:

1. In a period of seven years the freight-haulage expressed in mile-tons has doubled.

2. During the same period the "weight of trains, exclusive of freight," has also been doubled.

3. Notwithstanding an increase of 50 per cent. in the number of freight cars, the car-mileage per car has also been doubled.

4. While the haulage of *paying* freight has doubled, the haulage of dead weight, or *non-paying* freight, has nearly trebled.

5. This has reduced the ratio of paying load to dead load

ITEM.	1876.	1877.	1878.
Total cost of freight transportation	\$11,905,527.00	\$11,329,549.65	\$12,302,533.15
Number of tons of 2,000 lbs. of freight carried	8,803,680	6,351,356	7,695,413
Freight haulage in mile-tons, i. e., number of tons of freight carried 1 mile	1,074,447,055	1,619,048,685	2,084,355,368
Number of miles run by freight trains	9,278,266	9,774,038	11,109,497
Average weight of freight trains, exclusive of freight	400	400	500
Train haulage in mile-tons, i. e., number of tons of trains (exclusive of freight) carried 1 mile	3,711,306,400	3,900,615,200	5,554,748,500
Total haulage in mile-tons	5,385,753,455	5,529,563,885	7,630,103,668
Ratio of paying load to dead load	31 : 69	29 : 71	27 : 73
Number of freight cars (on 8-wheel basis—average weight, 10 tons)	15,310	15,661	15,964
Car mileage per car	21,210	21,843	31,315
Average car-loads (tonnage per car mile)	5.16	4.72	4.17
Cost of repairs of freight cars (average per car)	\$93.01	\$81.85	\$78.60

from 34 per cent. to 27 per cent. of total haulage; in other words, while it required a total haulage of three mile-tons for every mile-ton of freight in 1872, it required nearly four mile-tons for the same service in 1878.

These facts, taken conjointly, seem certainly to warrant

the following conclusions, viz.: That every increase in the haulage of freight or paying load has thus far necessitated a proportionately still greater increase in the haulage of dead load; that this item of steadily increasing ratio of dead to live load stands out alone, and in bold contrast to all other items which enter into the cost of freight transportation, as the only one in which no *relative* reduction has been made; and that, therefore, the reduction of dead weight in freight rolling-stock has become imperative, and a subject of the utmost importance in railroad economy.

The average weight of wooden cars is stated above at 10 tons. Substituting iron cars weighing on an average 9 tons in their place, we find that the *saving* in car haulage in 1878—all other things being equal—would amount to 499,912,660 mile-tons.

This does not represent either the only or the whole saving effected by this reduction in dead weight. Another immediate result is found in the increase of *ratio* between live and dead load from 27 : 73 per cent. to 29 : 71 per cent.—as favorable a result as was reached with wooden cars in 1877, when the "trains exclusive of freight" were each 100 tons lighter, and the freight tonnage amounted to 464,406,688 mile-tons less.

A further and still more important result from the substitution of iron for wooden cars will be found in the consideration that, since 500 tons does in all probability represent the *maximum profitable* train weight, and since therefore any further increase in freight tonnage cannot be met again by greater concentration of train loads, it will have to be met by an increase in the *number* of trains, and hence increased operating expenses. But, in the preceding calculation of decrease of train haulage with iron cars, the weight of trains exclusive of freight for the same number of cars amounted to only 455 tons. Therefore 500 tons of train weight represent (for iron cars) an increase of five cars per train or an increase of train capacity—with the same car tonnage as that of 1878—of 233,299,437 mile-tons of freight; in other words, an increase of 11 per cent. in the freight tonnage would be fully covered by the present train haulage.

The next item which attracts attention is the reduction in "average car-loads," corresponding to the increase in freight tonnage. The table of freight classification will be found to throw some light on this point.

Amount of freight, specifying the quantity in tons, carried during:

ITEM.	1872.	1873.	1874.
Products of the forest.....	317,727	425,115	458,527
Animals.....	783,579	962,767	973,653
Vegetable food.....	1,158,864	1,452,962	1,6,8,476
Other agricultural products.....	249,062	172,506	219,815
Manufactures.....	489,720	493,935	626,632
Merchandise.....	474,372	565,495	538,080
Coal.....			
Other articles.....			
Totals.....	918,411	1,449,044	1,619,678
	4,393,965	5,622,724	6,114,678

ITEM.	1875.	1876.	1877.	1878.
Products of the forest.....	383,704	404,564	414,869	415,565
Animals.....	832,935	827,278	855,430	1,024,071
Vegetable food.....	1,068,070	2,100,539	1,787,112	2,628,190
Other agricultural products.....	242,750	317,710	366,146	507,298
Manufactures.....	678,274	767,190	750,380	812,882
Merchandise.....	560,176	546,047	575,801	542,596
Coal.....	1,043,107	772,016	872,430	
Other articles.....	1,640,041	793,445	808,684	802,315
Totals.....	6,001,041	6,803,680	6,351,356	7,695,413

It is noticeable at once that the greatest increase is found in those items which constitute "through freight," from which results preponderance of traffic in one direction, and hence increased car mileage and greater number of "light trains," which, taken together, with an only slightly fluctuating local traffic, naturally tend to reduce "average car-loads."

Here the greater *carrying capacity* of the iron car becomes of moment. True, as long as this latter is of the same general dimensions as a wooden car, the number of cubic feet of available space will be the same, and therefore its carrying capacity for light and bulky freight cannot be considered as any greater, no matter what its strength may be. But looking at the "state classification" and taking the weight per cubic foot of the different articles coming under the various heads of classification, it is found that about 20 per cent. of all the freight carried consists of what may be termed "heavy freight," *i. e.*, such as will average 40 lbs. per cubic foot, or 20 tons (and more) per car-load. Of this kind of freight, the road carries now, whenever opportunity offers, say about 12 tons in a car.

To show what saving iron cars will effect in the transportation of this kind of freight, a case—which, although suppositions here, is of frequent enough occurrence in practice—may be in point.

Given 120 tons of freight, weighing 40 lbs. per cubic foot, to be carried 100 miles, cars returning empty:

Haulage in wooden cars: (12 tons of freight per car)
10 cars, weighing 10 tons each, 200 miles..... 20,000 mile-tons.
120 tons of freight, 100 miles..... 12,000 "

Total haulage..... 32,000 mile-tons.

Haulage in iron cars: (20 tons of freight per car)
6 cars, weighing 9 tons each, 200 miles..... 10,800 mile-tons.
120 tons of freight, 100 miles..... 12,000 "

Total haulage..... 22,800 mile-tons.

Difference in favor of iron cars..... 9,200 mile-tons.
or 29 per cent. of the total haulage.

It is almost needless to state that this saving of 29 per cent. on that class of freight, under the above conditions, is

a constant quantity, no matter what the mileage or tonnage may be.

The next item for consideration is "repairs." Averaging the cost of repairs per car for the last seven years, it is found to be \$94.71.

But when it is considered that this sum includes repairs made to foreign cars, an item which, apparently reciprocal, tells always most heavily against the road with the longer haul, and that by the prescribed manner of keeping the expense account of transportation, the credit due "to repairs" for "old material sold" is not made apparent, it will be readily perceived that while this figure is evidently *too high* to admit of a *fair comparison*, it would be impossible to say by just *how much* it is too high. Moreover, the question of the cost of repairs of iron cars is one that experience alone can *fully settle*; it seems self evident, though, that iron cars, from the greater durability and greater strength of the material they are mainly composed of, will need *less* repairs than wooden ones. In cases of total wreck, the *debris* of an iron car would still be worth from $\frac{1}{2}$ of a cent to one cent per pound, or about 20 per cent. of its original cost, while the wooden car in such a case is usually rendered worthless, and the *debris* set fire to, as the quickest way to get rid of the wreck.

Making the cost of repairs the true criterion of the life of any structure, it would seem but fair to consider a car *defunct* whenever the accrued interest on the original investment *together* with the total costs of repair equals the first cost of the car. This would make the life of a wooden car about *five years*, a result which corresponds very closely with actual experience. Then taking into consideration the experience gained from iron trucks and other iron structures subject to great wear and sudden shocks, it will probably be very safe to estimate the life of an iron car at 10 years.*

All the deductions made so far would, therefore, seem to leave no doubt that the substitution of iron cars for wooden ones would effect a very decided saving in transportation expenses. It now remains to be shown what the *amount* of this saving would be.

Here we are met at the outset with an almost unconquerable difficulty, by the manner in which transportation accounts are necessarily kept.

Still a careful scrutiny of the different items of "expenses allotted freight transportation," will, in a great measure, aid

Cost of repairs of tools and machinery in shops allotted to freight transportation.

Cost of fuel allotted to freight transportation.

The aggregate of which items, in the report of 1878, is \$4,037,431.40; hence that part of the cost of total haulage per mile-ton equals .0584 cent; total cost of car haulage, \$2,669,583.60; and the average cost per car, \$167.22.

Of the 2,084,355,368 mile-tons of freight, 20 per cent. is to be considered "heavy freight;" cost of haulage of this 20 per cent. in wooden cars, \$222,609.15, or *pro rata* per car, \$13.94.

Taking now the cost of a wooden car to be \$450 and its life five years, and the cost of an iron car to be \$650 and its life 10 years, then the former at the end of five years would have cost \$900, and the latter at the end of 10 years \$1,300, and making the comparison on *annual cost and cost of haulage*, as per report of 1878, the account will stand as follows, viz.:

Wooden Car	
Interest, repairs and deterioration.....	\$180.00
Haulage.....	107.22
Total.....	\$347.22

Iron Car	
Interest, repairs and deterioration.....	\$130.00
Haulage, \$167.22, less 10 per cent., less 20 per cent. of \$13.94.....	146.46
Total.....	276.46

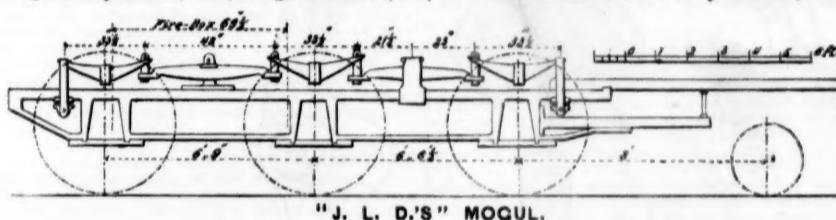
Difference in favor of iron car..... \$70.76
or about 20 per cent. under the conditions of rolling stock and traffic as reported for the year 1878.

To make a general application of the figures and results here obtained is, of course, entirely out of the question, as it is obvious that on another road the condition of the road-bed and superstructure, prevailing gradients, class of engines, and conditions of rolling stock, peculiar features and amount of traffic, facilities for repairs, method of keeping accounts, etc., etc., would one or all tend to more or less change these results.

Still, it is hoped that a fair and sufficiently favorable showing has been made to induce railroad managers to make a thorough investigation of this question of economy resulting from the substitution of iron for wooden cars.

A. F. HILL.

[In the first table given above, it will be observed that the average weight of freight trains on the New York Central Railroad for the years 1872, 1873 and 1874



"J. L. D.'s" MOGUL.

is given at exactly 250 tons for each year. For the three following years it is given at exactly 400 tons, and for 1878 at 500 tons. An inquirer will naturally ask how is it that this average weight is represented by such beautifully round numbers, and that they should be exactly the same for three successive years. If the figures are correct, it would be a coincidence so remarkable as to approach the miraculous. The inference must be that they are *not correct*, and that those who gave them simply guessed at the figures, and therefore for statistical purposes the latter have no value at all, and that any inferences based on them must be fallacious, or at least unreliable.—EDITOR OF RAILROAD GAZETTE.]

As it is necessary, for our purpose, to establish *that part of the cost of haulage per mile-ton which will be directly influenced by a change from wooden to iron cars, and the consequent decrease in dead weight*, only the following, out of the twenty-eight items constituting "Freight Transportation Expenses," have been held to bear directly upon the question at issue, viz.:

Fifty per cent. cost of repairs of road-bed allotted to freight transportation.

Cost of rails used in repairs allotted to freight transportation.

Cost of repairs of engines and tenders allotted to freight transportation.

Cost of repairs of freight cars allotted to freight transportation.

* In the *Railroad Gazette* of June 16, 1876, was published the translation of an article entitled "Iron Cars and Car-Frames in Europe," that had appeared about that time in the *Moniteur Industriel*, and was written to show the advantage of iron cars. We copy below part of the article of special interest at this time:

"According to the statistics of the cost of maintaining rolling stock, cars entirely of wood of 22,000 lbs. capacity cost about \$22 for maintenance yearly, and their average life is about 10 years. We understand by average life the time at the end of which the vehicle has cost in expenses for repairs as much as its purchase price. This average life is applied to vehicles which are not destroyed by accidents, fire, or other abnormal causes; in the latter cases the iron cars have the advantage, their wrecks being worth more than those of wooden cars.

"The cost of maintenance of iron cars is very low; a coating of some protective substance renewed yearly assures an almost indefinite life to the materials. The repairs other than those of the wheels, axles, springs—in a word, of the running gear and the draft apparatus—which are nearly the same as for wooden cars, are limited to the replacing of a few rivets, and a straightening of plates. Upon various Belgian lines where iron cars are used almost exclusively, especially for carrying coal, the average cost for maintenance is about 15 cents yearly.

"The life of an iron car cannot be determined for lack of material, the first of those cars having been put into service only about 15 years ago. There exists, however, a covered car entirely of iron, constructed 30 years ago, when the Belgian railroads began. It is still in perfect condition. However, no others were constructed, on account of the inconveniences resulting in summer from the great heat in close cars of plate iron. This was also the opinion of the Technical Convention of the German Railroad Union, held in Dresden, in September, 1865. The question submitted to the engineers belonging to the Union was decided unfavorably to covered cars of iron, but favorably to frames entirely of iron. As to cars with raised sides [gondola cars, etc.], their use was not sufficiently extensive to justify a decision.

"In Germany, where the use of cars wholly of iron for the transportation of merchandise is becoming general, the opinion is that since they have been used the working expenses due to renewals and repairs have diminished, the safety is greater, the derailments less frequent (on account of the parallelism of the axles, which is unchangeable). In Upper Silesia there were 1,200 cars wholly of iron in service in 1867, the first dating from 1861. On the Saarbrück roads there were about 1,000 at the same date. The former weigh about 12,100 lbs., the latter a little less.

"The dead weight of these cars of 22,000 lbs. capacity is generally greater than that of wooden cars. In Belgium, where these cars weigh only 10,100 to 10,500 lbs., it is not so; this arises from the more skillful use of the material by the builders of this country."—EDITOR RAILROAD GAZETTE.]

"J. L. D.'s" Mogul.
POUGHKEEPSIE, Feb. 11, 1879.
TO THE EDITOR OF THE RAILROAD GAZETTE:

I send you pencil sketch of Mogul engine frame, and the manner in which the springs and equalizing levers are placed, with the distances marked upon it, also the distance between centres of driving wheels and distance from driving-wheels to engine truck. Any information in regard to the trouble will be thankfully received. It is not for me to condemn the Mogul engine. I did not write to do that, but you know there is a good deal in how one is brought up, and as this is the only Mogul that I have had to do with, the facts, as previously stated, have not improved my opinion of them. The driving-box brasses are running to-day on the forward driving-axle that came with the engine from the builder, and when I put them back they had the oil ways in them $\frac{1}{2}$ in. deep that were cast in them originally. I have mentioned the facts to several, but have received no satisfactory answer; and I have written to you so that I might somehow ascertain the cause. I have no fault to find with the builders "or any one else," for I know of no locomotives that I should prefer to their build. But I have a preference as to style. I do not remember ever having any trouble with hot driving boxes, but I do remember having trouble with engine-truck brasses. Whenever anything goes wrong, I like to know the cause, and then the remedy is almost sure to come. It is for this reason I have written to you.

J. L. D.

[There does not appear to be anything wrong with the engine as represented in the engraving. It is possible that it may be raised too high on the truck, thus taking the load off from the front driving-wheels.—EDITOR RAILROAD GAZETTE.]

Measuring the Wear of Rails.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The wear of rails, especially steel rails, which show but slight wear within the period of a year, even if subjected to a heavy traffic, is so slight that an instrument by which this almost imperceptible wear may be accurately measured at stated periods, becomes of valuable assistance in forming estimates of the duration of rails.

The method of ascertaining the wear of rails by measurement has been practiced on the Continent for some time, but the results were not as satisfactory as wished for, owing to the imperfections of the instruments. An instrument has, however, been recently perfected by a leading manufacturer of mathematical instruments in Vienna, which seems to embody all the requirements for securing an accurate and very minute measurement of the wear; and it has since been adopted by the state railways of Austria.

The instrument is simple of construction and in application, and is readily attached at any point of the rail in the track. The measurements are made by means of an adjustable pin, movable on a large segment of about 150 degrees; the pin is made of steel and is graduated to the tenth part of a millimeter (.00393 part of an inch)—the casing of the

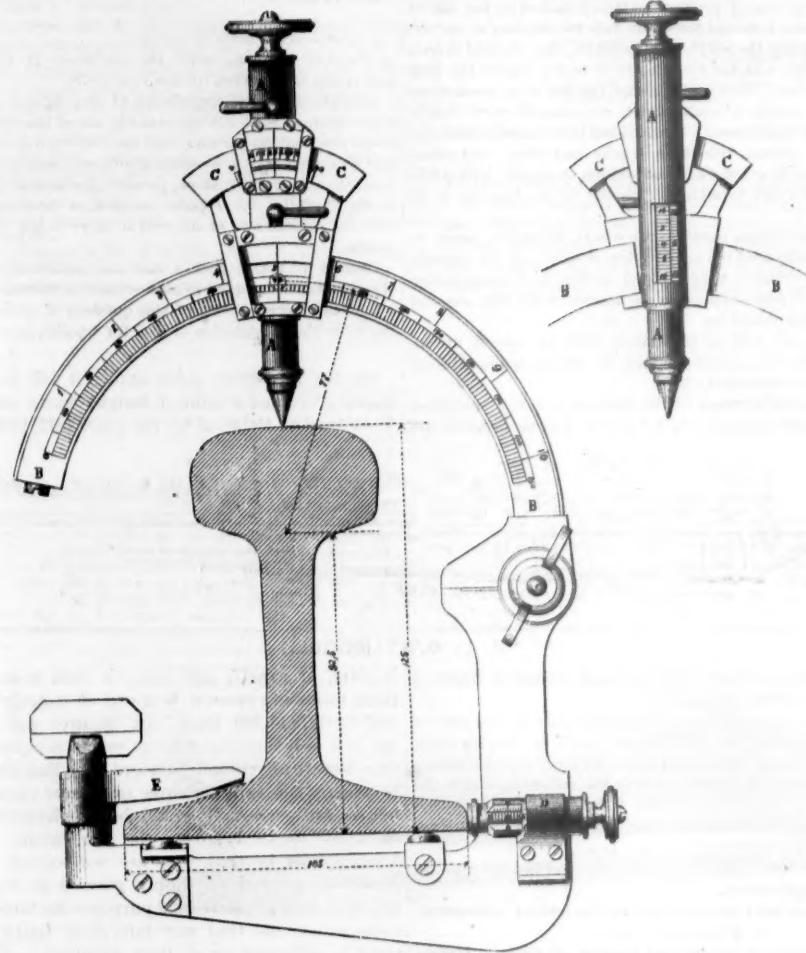
Paid-Up Stock.

Some of the Judges of the Federal Courts, in passing upon questions relating to the liability of shareholders in corporations, have lately fallen into the habit of quoting extensively the recent English decisions. Unless care is taken to keep in mind the distinctive grounds on which the English and the American courts proceed in charging shareholders of insolvent companies the practice of relying upon English decisions will mislead the American judge into a conspicuous departure from the doctrine established by the courts of this country, and this departure will not be in the direction of honesty and fair dealing.

In 1824 the fertile brain of Mr. Justice Story invented the doctrine that the capital stock of a corporation is a trust fund or pledge for the payment of its creditors. This doctrine, founded in the largest equity, has been sanctioned by decisions of the Supreme Court of the United States and of the highest courts of the several states wherever the question has arisen. It has never been disputed by an American court, and has become a principle of American jurisprudence, as well settled as any principle can be.

The capital stock of a corporation which is subject to the operation of this rule consists of all the stock which the members have subscribed.

This is deemed to consist of three funds: 1. Money which has been subscribed and paid in. 2. Money thus subscribed, but not paid in. 3. Money thus subscribed, but afterward improperly divided among the members, leaving the debts of the corporation unpaid. Stated in another way, the capital



INSTRUMENT FOR MEASURING WEAR OF RAILS.

Manufactured by Messrs. E. Kraft & Son, Vienna, Austria.

pin has a vernier similarly graduated, and by the means of these infinite divisions a very slight wear becomes perceptible.

The upper portion of the pin is provided with a small, graduated segment, in order to place the pin always in normal position to the wearing surface of the rail, when shifted to any portion of the large segment.

In addition to the usual gradations on the segment, there are noted, as a matter of convenience, ten points, corresponding with the general construction of the wearing surface of a rail, and from these points measurements are generally made, and should these be insufficient, the regular gradations on the segment will permit measurements to be taken wherever desirable.

Accuracy in attaching the instrument to the web of the rail is indispensable, and it has therefore been provided with an adjustable and graduated screw by which means the instrument can always be adjusted to the exact position occupied in the preceding measurement.

To secure the desired result, it is essential that records of the readings at the various points and dates be preserved, and that measurements be always made at the identical former points; by comparing the readings, diagrams can be prepared showing the wear at stated periods.

The writer believes that an instrument of this kind would be appreciated here, and that by its means much more accurate and definite information on the subject of wear of rails would be elicited than at present; and it is hoped that some of our leading makers of mathematical instruments will take this matter into consideration and furnish us with a similar instrument, or probably improve on the one above described.

W. MAHL.

LOUISVILLE, KY.

and the English Lords Justices of Appeal have lately settled down upon the doctrine that the rights of the creditor against shareholders exist only in the right of the company; that they can in general only claim to be paid out of the assets of the company, which assets are limited to what the company had a right to bring into the assets; that the official liquidator, who corresponds to a receiver or assignee in this country, can enforce the rights of the creditors against shareholders only in the right of the company. If, then, the shareholders, in organizing a company, have made such a contract touching the payment or non-payment of shares as would estop the company, while a going concern, from maintaining a suit for calls against a shareholder, the official liquidator in a winding-up proceeding after insolvency will be equally estopped from putting the shareholder on the list of contributories. This doctrine certainly sounds well in the abstract, but the interest centres in the application of it. A lot of rogues can put their heads together and agree to organize a company, and agree that the shares shall be deemed and treated as paid up, although nothing, in fact, is to be paid, and that the company is to be registered in the public registry of joint-stock companies as a company whose shares have been fully paid. This, in the opinion of the English equity judges, makes the shares paid, so that when the bubble bursts the official liquidator is powerless to compel payment to the creditors. The reasoning upon which these judges proceed is this: Such a contract cannot be modified; it is either valid in toto, or void in toto. If it is valid, the shareholders cannot be put upon the list of contributories, because their shares are paid up; if it is void, they cannot be put upon the list of contributories, because they have not agreed to take any shares except paid-up shares.

It is obvious that, in such a case, an American court would treat the shareholders as fraudulently withholding from the assets of the company its capital stock, and would compel them to disgorge this trust fund for the benefit of creditors; in other words, it would compel them to make good the registered lie which they had published to the world, by paying for shares for which they had never paid. But, in the view of the English courts, the creditor's remedy melts into thin air. It is, indeed, a breach of trust for the directors to issue paid-up shares, which have not, in fact, been paid, and the person receiving them with the knowledge that they have not been paid up is a participant in the wrong. But they say that he cannot be capriciously punished by being compelled to do what he has not agreed to do, and what he has falsely declared that he has done—pay for shares on which he has paid nothing. It seems that the company or its representative can proceed against him and recover the shares or whatever damage the company has sustained through the perpetration of the wrong. The effect of such an act, in this view, is not to make the share-taker liable *ex contractu* for the nominal value of the shares, but to make him liable *ex delicto* for their real value. This abominable doctrine has lately been adopted by the Supreme Court of Canada, some of the Judges dissenting, and a respectable court nearer to us held, presumably out of deference to the English cases, which were cited to it, that bonus shares issued as having been paid up to the extent of 60 cents on the dollar, no payment in fact having been made, are, in an action by creditors against the holders of them, to be deemed to have been paid up to that extent. No reason was given for this conclusion. The same question, relating to the same shares, was before the Circuit Court of St. Louis, and Thayer, J., in a well-reasoned opinion, held, upon the authority of Sawyer *vs.* Hoag (17 Wall., 610), that the shareholders were to be chargeable as though nothing of this 60 per centum had been paid.—*Central Law Journal*.

The English Trade-Union of Railroad Men.

The quarterly report of the General Secretary of the "Amalgamated Society of Railway Servants," throws some light on the objects and methods of this organization, which is made up of men of all branches of railroad service. We quote a statement of the few cases in which the society secured legal assistance for its members:

Moden, of Battersea.—This member, a goods guard on the London, Chatham & Dover Railway, was committed for trial on the charge of manslaughter arising out of the accident at Sittingbourne, by which four persons met their death. He was tried at Maidstone before Lord Justice Cattan, and defended by Mr. Douglas Straight and Mr. Masley. The evidence adduced and the comments of the learned judge leave no doubt that Moden was not only blameless, but deserved commendation for his efforts to avert the effects of the mistake made by the under-guard, who was incompetent by reason of his inexperience and unqualified for his occupation, even had he had experience, by reason of deafness. The coroner's jury had been biased by the somewhat partial evidence of Colonel Rich, who apparently strove to shield the company at Moden's expense. He was acquitted and commended by the judge for his conduct.

Cooper, of Peterborough, No. 2.—This member, an engine-driver on the Great Northern Railway, ran past signals on entering York yard, and came into collision with a North-eastern train which was standing on a siding. A wagon-examiner was unfortunately killed. Cooper was tried at York, on the 24th inst., for manslaughter. Mr. Waddy, Q. C., and Mr. Wilberforce were retained for the defense. Although a most able defense was made, the evidence of Cooper's negligence in failing to heed signals could not be overcome. The jury found him guilty, but strongly recommended him to mercy. He was sentenced to three months' imprisonment without hard labor, and the judge showed every consideration for him. When in prison he is simply to be confined, and not mixed with other prisoners. Although he was convicted, there can be no doubt but that the efforts of counsel induced to the mitigation of his sentence. The defense was a costly one. The Society was, however, bound to do its utmost for a member who was the subject of a misfortune which might occur to the best of men. His offense was a momentary inattention, which may justly be described as a human fallibility, to which the most attentive servants are liable. During the many years he served on the Great Northern he had never been fined or found fault with. On the contrary, he was respected by the officials as a sober and reliable driver.

Kirkham and Potter, of Paddington.—These members were discharged from the Great Western locomotive department. One was employed a day, and the other two days after the expiration of their notices, and then discharged. Our solicitor was of opinion that this entitled them to a month's money, in lieu of notice. They made their claim, which Mr. Kirkley admitted was legal, and eventually each was paid a month's wages. These members were dismissed for being discontented, and as a means of frightening other men from proceeding with a memorial to the directors, which was under consideration.

White, of Bath.—This was a case of arrest by the Great Western Company, on suspicion of theft. The member was committed for trial to the Sessions. The counsel for the company, however, withdrew from the prosecution before the hearing, and White was dismissed. Acting under legal advice, I have authorized an action against the Great West-

ern Company for illegal arrest. It will be a claim for damages. Nothing had been stolen from the company, and therefore it cannot be pleaded that there were reasonable and probable grounds to suspect White of stealing, in order to justify his arrest.

Wilkinson, of Middlesbrough.—This member, by the aid of the Society, sued the Northeastern Railway Company for wages in lieu of a sufficient notice to quit their employ. The strike on the Northeastern Railway in 1867 led to long terms of notice, being agreed on to terminate the contract between the workmen and companies since amalgamated with the Northeastern Railway. These contracts have, it would appear, been set aside by the general rules brought into force by the company, and which apply to all their servants. While willing to concede a case for a higher court, the judge non-suited the plaintiff. It was undertaken to test the merits of the agreement, and our solicitors were opposed to any further proceedings in the matter.

Resistances of Railroad Curves.

In a discussion, June 5, 1878, by the American Society of Civil Engineers, of a paper by S. Whinery, C. E., "On the Theoretical Resistances of Railroad Curves," Mr. Octave Chanute spoke as follows:

It is interesting, but perhaps misleading to note that Mr. Whinery, from purely theoretical considerations, has arrived almost exactly at the amount of curve resistance for cylindrical wheels, which has been ascertained to exist, by experiment, upon ordinary wheels, at low speed.

As the resistance depends upon the number of degrees of curvature traversed, and as all the elements enumerated by the author vary with the amount of sharpness of the curve, with one exception, and the latter is of small relative importance, we may reduce these elements to factors of the degree of curvature, and they will then be as follows, for each degree of angular deflection per hundred feet:

Resistance of curves in pounds per ton per degree, 4 feet $8\frac{1}{2}$ in gauge:

Twist of wheel, or rotation on itself 0.0010 lb.
Slip of wheel on shorter inner rail 0.1713 " 0.1713 "
Flange friction to change direction 0.2450 " 0.2450 "
Loss of power at couplings, from 0.0020 to 0.0213 "

Total resistance per degree 0.4386 lb.

The last element alone not varying directly with the degree of curvature.

We may assume, therefore, that the result of the investigation is, that curves add about one-half pound per degree to the resistance on straight lines—some additional elements being stated to have been left out.

In 1854, Zerah Colburn satisfied himself in a series of experiments on the 6-ft. gauge of the Erie Railway, that the curve resistance was about one-half pound per ton per degree, and this factor has been used upon this line ever since, in calculating curve resistances.

In 1844, Mr. B. H. Latrobe made a series of 36 experiments on curve resistance, on the 4 ft $8\frac{1}{2}$ in. gauge of the Baltimore & Ohio Railroad. The average result of these experiments, as stated in Vose's "Manual for Railroad Engineers," was, that the resistance was 6.80 lbs. per gross ton of 2,240 lbs., on a straight, level line, and 13.22 lbs. per gross ton on a curve of 400 ft. radius, or on an angular deflection of $14^{\circ} 19\frac{1}{2}'$, at speed varying from $1\frac{1}{4}$ to $3\frac{1}{2}$ miles per hour.

The resistance, therefore, was as follows:

	Per gross ton.	Per net ton.
On curve $14^{\circ} 19\frac{1}{2}'$ 13.22 lbs.	11.81 lbs.	
On straight line 6.80 "	0.67 "	
Increased resistance 6.42 lbs.	5.74 lbs.	
Increased resistance per degree 0.4488 lb.	0.4008 lb.	

Or almost exactly the same as calculated in the paper of Mr. Whinery.

Very recent experiments (May, 1878), upon the Metropolitan Elevated Railroad in New York, have shown an increased resistance produced by a curve of 90 ft. radius ($63^{\circ} 40'$) of 350 lbs. for a single car of 10 tons, and of 1,100 lbs. for a train of four cars, weighing 40 tons, both with fixed wheels, and on a gauge of 4 ft. $8\frac{1}{2}$ in. Thus, in the first case the curve resistance was 0.5497 pound per ton per degree, and 0.4319 pound per ton per degree in the second.

The latter experiment having also included a train with loose wheels, it may be interesting to give the details. Each train consisted of four cars, weighing 40 tons, one with ordinary wheels fixed on the axle, and the other with loose wheels. The curve was of 90 ft. radius.

	Rigid wheels, 40 tons.	Loose wheels, 40 tons.
Traction on curve ($63^{\circ} 40'$) 1,700 lbs.	1,300 lbs.	
" straight line 600 "	450 "	

Increased resistance 1.100 lbs. 850 lbs.
Increased resistance per ton 27.50 " 21.25 lbs.
Curve resistance per ton per degree 0.4319 lb. 0.3337 lb.

It will be noted that the loose wheels show a less resistance than the fixed wheels, by 22 or 23 per cent., both on curves and on straight lines. The difference on straight lines proves little, the trains being different; whether the difference of 150 lbs. upon the curve will compensate for the increased complication, future experience must decide. The resistance on straight lines is in both cases too great, being 15 lbs. per ton for the fixed wheels, and $11\frac{1}{2}$ lbs. per ton for the loose wheels, while at the low speed at which these experiments were tried, it is generally from 4 to 10 lbs. per ton on our American railroads.

I regret not to have at hand the record of some English experiments, but I believe that the British practice is to allow about one pound per ton per degree, for the increased resistance on curves.

There is in Spon's "Dictionary of Engineering" a very full account of the numerous experiments made in France in 1862, 3 and 4, by three French engineers, Messrs. Vuillemin, Guebhard and Dieudonné, upon the resistance of trains under all conditions of working.

Among other things, they ascertained that at a speed of 15 or 16 miles per hour, a curve of 1,000 meters, or 3,281 ft. radius (say $1\frac{1}{4}$ degree curve), added one kilogram per French ton, or 2 lbs. per net (American) ton, to the resistance on straight lines. On a curve of 800 meters radius, or 2,624 ft. (say $2^{\circ} 10'$) the increased resistance was 3 lbs. per net ton. The increased curve resistance, therefore, was 1,1428 lbs. per ton per degree in the first case, and 1,3820 lbs. per ton per degree in the second.

It must be remembered, however, that these English and French factors were obtained with European four-wheeled cars, whose long, rigid wheel-base must develop greater curve resistance than our short and pivoting American truck.

The agreement between the results of experiments, and of the theoretical calculations in the paper under discussion, would be more satisfactory if the latter had been made for conical, instead of cylindrical wheels. The author admits that on a curve of 1,887 ft. radius, with coned wheels of the Pennsylvania Railroad standard, the two principal elements of resistance, that from the slip of the inner wheel, and the flange friction in changing the direction (amounting to

gether to 0.4163 lb. per ton per degree), would disappear if the wheels assumed their proper position on the track.

He points out, however, that in order that this shall occur, two conditions must obtain simultaneously: 1st, that the curve shall be of the radius corresponding to the coning of the wheels, and 2d, that the speed shall correspond to that for which the outer rail is elevated.

Not only do these two conditions but seldom occur exactly together in practice, but there is an additional element of resistance, incapable of exact computation, which not only adds considerably to the resistance, but prevents the wheels from adjusting themselves to their proper position on the track, and remaining so around the curve.

This consists of the additional flange friction which results from the oscillations of the truck upon its pivot. These occur upon straight lines, but more especially on curves where the impulse given to the wheel in changing its direction drives the truck diagonally toward the opposite rail. These oscillations cause the wheel flanges to impinge first on one rail, and then on the other, and thus both add to the resistance, and prevent the coning of the wheels from being continuously effective.

It is improbable that the constant variations in the resistance of trains, indicated by the dynamometer, are largely caused by this varying flange friction, due to the swaying of the truck from side to side.

An additional element of resistance is due to the fact that the axles, being held rigidly parallel by the framing of the truck, cannot assume a truly radial position to the curve, and hence the tendency of the whole is to roll in a straight line, even when the coning of the wheels brings unequal diameters to bear upon the two rails. It may be doubted, therefore, whether the fourth element of resistance, enumerated by the author, that due to the flange friction requisite to change the direction, is ever eliminated in any position of the wheels on the curve.

It may, however, be noted that the resistance on straight lines due to the coning of the wheels will be considerably overestimated in the paper under discussion.

The author is quite correct in stating that the part in contact between the wheel and rail is a surface. The metal, being elastic, yields in both wheel and rail, and the portion in contact, instead of being a line, is a parallelogram more or less irregular in outline. I measured these surfaces some years ago, under the driving wheels of locomotives, and found that they varied from 0.13 to 0.42 of a square inch in area, corresponding to pressures from 85,961 to 26,607 lbs. per square inch, the diagrams having been published in the *Railroad Gazette* for April 21, 1876.

It is an error, however, to assume that for car wheels this parallelogram is anything like one inch in length, transversely of the rail. This was probably arrived at by assuming that the portion of the rail kept bright by the trains, truly represents the length of contact. This bright portion, however, is not only kept so by the action of successive wheels, many of them much worn, which strike various points on the rail, but is also largely the result of the attrition of the driving-wheels of locomotives, which are but slightly coned in the flanged tires, and not all in the blank tires. It does not, therefore, give a true measure of the length of the parallelogram of contact. It is probable that for a new car-wheel upon a new rail, it does not exceed $\frac{1}{4}$ of an inch in length, and in fact the bright streak left by the first few trains upon the Elevated Railroad in New York, now about ready for operation, does not exceed $\frac{1}{4}$ to $\frac{1}{2}$ of an inch across the face of the rail.

The error in the assumption of the length of this surface of contact causes a corresponding error in the calculations of the resistance due to the coning of the wheels, which, instead of being about half a pound per ton on a straight line, is probably not more than $\frac{1}{2}$ to $\frac{1}{4}$ of a pound per ton, or materially less than the curve resistance for a single degree, while the curve resistance, say on a ten-degree curve, would be about five pounds per ton.

New York Railroads in 1878.

The report of the State Engineer of New York has been submitted to the Legislature, though not yet printed. It is for the year ending Sept. 30, 1878, and gives the following figures:

The total mileage of railroads in the state is 5,752.34 miles, of which 107.79 miles of steam road and 8.24 miles of horse railroad were built during the year. The steam railroads are equipped with 2,801 locomotives, 1,993 first-class passenger cars, 358 second-class and emigrant cars, 741 mail, baggage and express cars, and 59,413 freight cars. Some figures as to capital and earnings are as follows:

	Steam roads.	Horse roads.
Stock \$392,164,754	\$23,167,130	
Funded debt 337,454,527	15,756,000	
Floating debt 22,491,438	2,371,855	
Total \$752,010,719	\$41,295,962	
Cost of road and equipment 661,078,136	40,316,371	
Traffic:		
Passengers carried 48,769,084	244,390,364	
Tons freight carried 38,320,573	
Earnings:		
Gross earnings \$89,449,434	\$13,000,515	
Expenses 55,807,841	8,906,426	
Net earnings \$33,641,593	\$4,184,089	
Amount paid in dividends 14,642,164	1,918,104	

The steam railroads increased their capital stock \$7,255,616, their funded debt \$5,422,606, and diminished their floating debt \$8,123,682; cost of road was increased \$23,205,058.

The amount paid in dividends was 3.73 per cent. on the total stock for the steam, and 8.28 per cent. for the horse roads. Working expenses were 62.39 per cent. of earnings for the steam, and 68.04 per cent. for the horse railroads.

During the year 322 persons were killed upon the steam roads, and 567 were injured. The total horse railroad accidents were 155, 44 of which were fatal. According to the report the railroads of the state were probably never in a better condition than now, and are considered as fully equal to those of any other state. During the past year 26 corporations have been formed, and 20 have become extinct. In all 802 railroad corporations have been formed under the laws of the state, and 275 now remain in existence. The total number of companies reporting to the State Engineer is 285. This includes 10 companies formed under the laws of other states and owning or operating roads in New York. At the time required by law (Dec. 1) 100 companies failed to report, and have rendered themselves liable to a penalty of \$250, and \$25 per day until the report was received. Six companies have only reported by letter, 12 have reported the projects abandoned and 11 have not reported. The State Engineer recommends the prosecution of all companies that have not complied with the law.

Out in Oregon when a railroad man is not paid on time he loads up his shot-gun, sharpens his bowie-knife and goes for the Superintendent, Paymaster or any other officer of the road he may chance to meet. The pay-train generally gets around promptly.

THE SCRAP HEAP.

A Railroad on the Ice.

A correspondent of the St. Paul *Pioneer-Press* writes from Bismarck, Dakota, as follows of the Northern Pacific crossing of the Missouri River on the ice, which has already been briefly mentioned from the telegraphic dispatches:

"The passage of the first locomotive over the Missouri, yesterday, was an event in the history of the Northern Pacific. General Rosser's palace-car was crowded with gentlemen who had the pleasure of seeing the affair from as many standpoints as the weather would permit. The first experiment was with a locomotive and two flat cars loaded with iron. The cart went before the horse, and glided over smoothly and safely. The triumphant switch-engine, when he reached the sand-bar, blew his whistle as if he had accomplished something. It was too cold for cheers. We were willing to let the locomotive do the hurrahing. Returning, the engine was coupled to the car occupied by the invited guests, and, with three flats loaded with iron, leisurely ran over the river. The channel is not more than one third the width of the stream in the spring or summer. The distance from bank to bank is 3,300 feet. The west side is now a huge sand-bar. Out on this bar the track-layers were at work, with Chief Engineer Rosser standing in the midst, clad in fur overcoat and cap. All hands were bundled up. Frost-decorated whiskers were plenty. Several upper lips looked like the iced cornice over your lady's bower. General Rosser was so interested in the work that he remained in immediate command until sundown, freezing his nose and cheeks.

"As far as can be ascertained this is the first railroad track that was ever built upon the ice. General Rosser was advised against the experiment. There was no precedent for it, and all the railroad men said, 'Don't do it.' There was nothing in the books to copy after or be guided by. The crushing strength of a cubic foot of ice was no pointer. Ice differs in quality as much as butter—good, bad and indifferent. General Rosser tried an experiment. He piled 50 tons of earth upon an area twenty feet square. The next morning when he returned to the river the dirt was gone. The ice under the earth had dropped out like a piece of glass before a rifle ball. It was 32 inches thick. The whole was the exact shape of the base of the dirt pile. There was no bend to that ice. When it could no longer sustain the weight it snapped and went under. It was a clean cut job, and no ragged edges. The experiment was satisfactory. General Rosser put down ties 12 feet in length and 12 inches in width, three feet centres, and on these he placed rails 30 feet in length, with no two segments terminating upon the same tie. As no locomotive or train will be stopped upon the ice there will be no opportunity given for settling. Besides a moving train will pass over somewhat upon the principle of a skater. Ice will stand a moving body that would quickly go through when stationary. The Chief Engineer is entitled to a long credit mark. I think he has made a discovery and proved himself a progressive engineer. Nature is helping him. The ice to-day in some places is 42 inches thick."

Reading Headings of Long Columns.

The Aurora (Ill.) *Beacon*, says: "H. M. Ellsworth is just now executing a most tedious job of lettering upon some labor-saving rules. These rules are an inch in width, their length corresponding with the width of the large sheet upon which is printed the monthly and annual statement of expenses incurred and service performed by each engine on the Chicago, Burlington & Quincy road, and upon their face is an exact duplicate of all the minutiae mentioned in the headings of those sheets. The rule is of metal, painted black, the letters, of which there must be five or six hundred, being white; and it will be at once apparent that the device will prove of wonderful advantage to the weary clerk condemned to wander through those bothersome columns of figures in making his comparisons, as by slipping this rule up or down the sheet he has the headings of all columns ever at the exact spot desired."

The difficulty of following long columns will be appreciated by those who have to read them, and especially by those who have to make entries in them; but usually an index rule can be easily made by cutting from the blank the line of column headings and pasting it upon a suitable rule.

Giving Instructions.

A good story is told of Tom Clark, one of the old Chicago, Burlington & Quincy conductors, who is still on the line. When Tom was first set up as conductor, John Watkins sent him to pick up some old iron between Mendota and Arlington, and, of course, he had a great deal on his mind, thus being about his first trip in that capacity. There was not much time to spare, as a passenger train was shortly due at Arlington from the West, so that when they reached the iron the section men were on hand to load it. Tom then went to the engineer and told him that they could remain there until the passenger was within a mile or two before getting out of their way, it being a straight line, and Arlington visible in the distance. The engineer listening to him patiently, and then gruffly replied: "See here, young man, when that bell rings, you want to climb on if you're going with me!" Tom went to the war, and whenever he undertook to spin any big yarns in camp, the boys could always effectively squelch him by remarking: "Young man, when you hear that bell ring, you just want to git!"—Aurora (Ill.) *Beacon*.

Make Room for the Mourners.

Once on a time, when John Satterfield was running freight on the East End, he left the South Branch one day with a big train, and on approaching the side track between there and Harlem found a Galena train waiting on the main track, and promptly offered to bet the cigars with his engineer that he would make the other train take the side track. Accordingly, John came to a halt, and jumping off, ran up to the other conductor with an anxious expression of countenance told him that his father was dead, and he wanted to get home as soon as possible, whereupon the Galena man kindly proposed to take the side track. As John's train passed, he manifested still further sympathy by inquiring when his father died, and with an exasperating leer "Sat" yelled back, "Fifteen years ago!" The volume of invective in which that Galena conductor sought to ease his mind was simply appalling—indeed, the small audience who witnessed his rage insist that his way car was enveloped in blue flame as he once more pulled out upon the main track, and the whole neighborhood was impregnated with the fumes of sulphur.—Aurora (Ill.) *Beacon*.

Emigrant Sleeping Cars.

The Central Pacific Company is fitting up at its shops in Sacramento 25 cars for use on its emigrant trains. The seats are so made as to form sleeping berths very much after the manner of ordinary sleeping cars, and upper swinging berths are provided, which can at night be hung from iron rods provided for the purpose, while in the day-time they are stowed away up under the roof. The cars are very plain, but will be a great advance in comfort over the ordinary cars heretofore used on emigrant trains.



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CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

CONTENTS.

ILLUSTRATIONS:	Page.
Three-Wheeled Hand-Car	123
An "I-Cycle"	124
J. L. D.'s Mogul	125
Instrument for Measuring the Wear of Rails	126
Contributions:	
Thou Shalt Not Drink	123
Steam-Ports of the Boston & Albany Locomotive	123
Measure of Curve Resistance	123
Momentum and Energy	124
An I-Cycle	124
Iron Cars—Are they More Economical than Wooden Ones?	124
J. L. D.'s Mogul	125
Measuring the Wear of Rails	126
Editorials:	
Mechanical Research	128
Pennsylvania Railroad Re- port	128
East-Bound Freight Pool	129
New York Grain Routes	130
Record of New Railroad Construction	130
ILLUSTRATIONS:	Page.
Three-Wheeled Hand-Car	123
An "I-Cycle"	124
J. L. D.'s Mogul	125
Instrument for Measuring the Wear of Rails	126
Contributions:	
Thou Shalt Not Drink	123
Steam-Ports of the Boston & Albany Locomotive	123
Measure of Curve Resistance	123
Momentum and Energy	124
An I-Cycle	124
Iron Cars—Are they More Economical than Wooden Ones?	124
J. L. D.'s Mogul	125
Measuring the Wear of Rails	126
Editorials:	
Mechanical Research	128
Pennsylvania Railroad Re- port	128
East-Bound Freight Pool	129
New York Grain Routes	130
Record of New Railroad Construction	130
GENERAL RAILROAD NEWS:	Page.
Meetings and Announce- ments	123
Elections and Appoint- ments	123
Personal	123
Traffic and Earnings	123
Railroad Law	124
The Scrap Heap	127
Old and New Roads	134
ANNUAL REPORTS:	Page.
Chicago, Burlington & Quincy	136
Pennsylvania Railroad	136
MISCELLANEOUS:	Page.
Paid-up Stock	126
The English Trade-Union of Railroad Men	126
Resistance of Railroad Curves	127
New York Railroads in 1878	127
The General Railroad Situ- ation	131

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed to the EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

MECHANICAL RESEARCH.

In the *Railroad Gazette* of March 10, 1876, an editorial was published which suggested the appointment of committees on mechanical research by such associations as the Master Mechanics', the Car-Builders' or the Society of Civil Engineers. The value to railroad companies and the public generally which carefully made experiments would have has often been dwelt upon in these pages. The practical difficulty in the way is in inducing railroad companies to co-operate with that end in view. The expense of making such investigations is usually too great for any individuals to incur, unless they have some personal interest to advance by such expenditure, and thus far very few persons have been able to secure the confidence of railroad corporations or their officers sufficiently to induce the latter to appropriate money for experimental investigations. It was therefore proposed, in the article referred to, that one or more committees should be appointed by the Master Mechanics' and perhaps other associations to "determine what kind of investigations and experiments are most needed, and the direction in which such work would be most profitable. Such a committee could also determine the conditions and establish rules for making such investigations, and then select and employ the most competent person whose services could be procured to conduct and superintend the work. He would report to the committee, and be subject to their control. They would direct the expenditure of money, audit his accounts and assume the responsibility, and make reports of all that is done. By this means different persons who

are experts could be selected for making experimental investigations of subjects concerning which information is needed by railroad companies, and which possibly have been subjects of special research by those selected to elucidate them still further. Such a plan would secure the ablest men in the different departments of railroad engineering, who, when they began to work, would have more knowledge of the subjects to be investigated than any one else, and would therefore work at an immense advantage over those who have no such preliminary information."

This idea, which did not seem to meet with much favor from our American associations, or at least was never put into any practical form, has just been acted upon by the Institution of Mechanical Engineers in England, and the following circular has been issued by the Council of the Institution. It is proposed:

"That a Research Committee, consisting of five members of Council, be appointed by the Council annually, and that a sum be voted at each annual general meeting to be expended by the committee."

"That the first duty of this committee, when appointed, be to prepare a list of subjects on which further research is desirable, and present it to the Council, recommending certain subjects to be first investigated."

"That the Research Committee shall then appoint a sub-committee for each of the selected subjects, and invite gentlemen (not necessarily members of the Institution) to give assistance to such sub-committees."

"That the use of the officers, offices, stationery, etc., of the Institution shall be at the disposal of the Research Committee and sub-committees, but that if any additional clerical assistance is found to be necessary, such assistance is to be charged to the Research Fund."

"That it be an instruction to each sub-committee that its first duty is to collect and collate all the records of experiments and other information already existing on the subject; then to determine what further experiments, if any, are needed, and ascertain their probable cost; and to present a report to the Research Committee, embodying a summary of the information so obtained, a description of the experiments proposed to be made, and an application for the requisite funds."

"The expenses incurred in preparing these reports to be provided by a vote of the Council."

"That upon the approval of any report of a sub-committee by the Research Committee, they shall then make an application to the Council for such sum as they may see fit to recommend for the use of the sub-committee in carrying out their investigation."

"These reports to be printed, subject to revision, and circulated among the members, with a view to elicit further information."

"That the Research Committee shall present from time to time to the Council a report, giving a summary of the progress by each sub-committee, and full account of the sums expended."

"That when any inquiry has been completed, the results obtained and the preliminary reports shall be combined together into a final report by the sub-committee, which shall be presented by the Research Committee to the Council, who may then print and circulate it among the members, or, after a final revision, publish it in the 'Proceedings.'

"That as the subjects first selected become exhausted, the Research Committee to recommend others to the Council to be proceeded with."

"That in all cases where the Council think it desirable, the subject when completed shall also be treated in a paper, to be read and discussed at a general meeting."

It will be seen that this action of the Institution of Mechanical Engineers puts into practical operation the method suggested in the *Railroad Gazette* three years ago. The committee appointed by the Institution are Dr. Siemens, Mr. Wm. Anderson, Mr. E. A. Cowper, Mr. A. Paget, and Mr. F. W. Webb, a committee of which *The Engineer* says: "The names of these gentlemen are a sufficient guarantee that the work will be carried out both with energy and discretion."

The circular which the Council of the Institution issued has been given in full in order that our readers may get as clear an idea as possible of the plan proposed and the methods to be employed to carry it out.

There probably would not be much difficulty in inducing railroad companies to give money for making experiments relating to some specific subject of immediate practical importance to them and to their business. If, however, an application is made for money to be expended in some vague and indefinite manner, and which, it is probable, may be wasted without accomplishing any good purpose, they very properly tighten their purse-strings.

The case would be different though, if men who are entirely trustworthy and honest should undertake to make a series of experiments to show the relative economy of Mogul engines and American locomotives of the class built we will say by Mr. Eddy, at Springfield, Mass.—a matter which is now being warmly discussed in our pages. Suppose that a committee consisting of, say, Mr. Hudson, of the Rogers Locomotive Works; Mr. Peddle, of Terre Haute; Mr. Wells, of Jeffersonville, Ind.; Mr. Lauder, of Concord, N. H., and Professor Thurston, of the Stevens Institute, should undertake to direct a series of experiments, to determine which engine is the most economical, or the conditions under which the one or the other would be the most economical. If a committee of such men would do what the Institute of Mechanical Engineers has specified, "first collect and collate all the records of experiments and other information already existing on the subject, then determine what further experiments, if any, are needed, and ascertain their probable cost,"

and then ask for money to defray the expense, probably there would be no difficulty in getting all that would be required. The danger in all such cases is that the money expended will be wasted, that there will be no competent or responsible persons to direct its expenditure, and that it will be frittered away without accomplishing any useful result. The plan adopted by the Institution of Mechanical Engineers seems to guard against this, and by placing the matter in charge of a responsible committee, whose duty it will be first to specify distinctly what should be done, and then estimate the cost of it, bring the whole matter within clearly-defined limits, and would keep it under the control of persons who have it in charge.

It is probable that with some general organization of railroad companies similar to the German Railroad Union, the objects aimed at might be attained equally well or better, but the difficulties in the way of forming such an organization are very great, as has been shown by the history of American organizations of railroad companies, like the Railway Association of America, etc. In engineering, however, the railroads are not competitors, and this is one reason why the meetings of the master mechanics and car-builders are usually harmonious, whereas traffic managers frequently disagree.

As some one has said, it is always better to try to accomplish what can be done than what might be. The appointment of a committee for mechanical research by any of the associations named is a matter which can be accomplished with comparative ease, and seems to be worth a trial at least. The number of subjects which might be profitably investigated by such committees is much greater than may at first be supposed. Those of our readers who read the very interesting report of experiments made by Mr. Verderber, on the Hungarian State railroads, with locomotive fire-boxes without water spaces, will see how desirable it would be if the railroad companies, especially those in the Western States, where there is so much trouble from incrustation, could have the practicability and economy of such fire-boxes put to an experimental test. The cost of constructing such a fire-box, and of testing it thoroughly, would probably not exceed three or four thousand dollars. A contribution of say 10 cents per mile on the length of the roads most interested in it would secure a thorough investigation, and, if it confirmed what Mr. Verderber has stated, it would open the way for an annual saving of many thousands of dollars annually, and would reduce very materially the first cost of all new boilers and engines.

At the present time the whole subject of draw-bars is in a great state of confusion. There are as many kinds as there are roads, or more, and no one seems to have any distinct idea of what the requirements for such parts of cars are. The result is endless confusion and expense, whereas if some best form could be adopted it would result in the improvement of draw-bars in future, and also secure that much-desired end of uniformity.

Some years ago the same condition of things existed on the German railroads. Some committee or commission was therefore appointed to investigate the subject. The members of it first calculated the strength of the existing draw-attachments, and then tested them to destruction. If we remember right, their calculations and experiments in all cases indicated the same points of weakness. This indicated where the parts needed strengthening, and a new draw-attachment was thus designed, of very much greater strength and durability. A similar investigation here would work a sort of millennial reform for yard and train-men. In fact, the imagination of an engineer is apt to run wild in the bare contemplation of the field which such a system of investigation might open up. One advantage, however, of it is that it can be commenced in a very small way, and its practicability thus be thoroughly tested. The results will indicate the direction and the extent to which the method is applicable and how far and in what way it can best be applied. American engineering associations could therefore hardly do better than to follow the example of their English brethren and put this method for carrying on mechanical research to a practical test.

THE PENNSYLVANIA RAILROAD REPORT.

The Pennsylvania Railroad Company, though it owns but about 480 miles of railroad, works directly through its own organization, through the Pennsylvania Company, and through other railroad companies whose management it dictates, about 5,175 miles of railroad, extending from New York, Philadelphia and Baltimore on the Atlantic to Erie, Ashtabula, Cleveland, Toledo and Chicago on the Lakes, to St. Louis on the Mississippi, and to Cincinnati and Louisville on the Ohio—with the exception of New York and New England

reaching the most of the country east of Chicago and St. Louis that has a heavy traffic. It need not be said then that the record of the operations of this vast property has a general interest, indicating as it does the condition of traffic, and of industry so far as it is reflected by traffic, of a vast portion and the most important portion of the country.

The report of the Pennsylvania Railroad Company, it is true, does not go into details of the operations of the lines west of Pittsburgh and Erie, which make up nearly two-thirds of the total mileage (though yielding but two-fifths of the total earnings); but these Eastern ones, as the ones with which the Western lines make their chief interchanges, reflect pretty well the prosperity of the whole system, and enough figures are given for the whole (earnings and traffic for about 4,175 miles out of 5,175) to assist in forming conclusions as to the condition of the country which it serves.

To this end we cite the report of gross and net earnings and working expenses for the whole system worked directly (1,716 miles east and 2,407 miles west of Pittsburgh) for the past five years:

All Lines Directly Operated, East and West of Pittsburgh.

Year	Gross earnings.	Working expenses.	Net earnings.
1874.	\$62,938,351	\$39,422,645	\$23,515,706
1875.	58,096,866	36,574,141	21,522,725
1876.	61,561,211	39,495,737	22,065,474
1877.	54,159,720	34,022,329	20,137,391
1878.	55,426,063	33,611,034	21,815,928

The Centennial year was exceptional for this company more than for any other. But for the great passenger traffic of that year (chiefly east of Pittsburgh and Erie), both gross and net earnings would doubtless have been much the smallest in the history of the road. Allowing for that, we may say that gross and net earnings kept growing smaller and smaller until 1878, when for the first time there is an improvement in both. Considering the extent of the system here reported, and the fact that the roads composing it have average earnings of more than \$18,000 per mile (twice as great as the average for the whole United States), this certainly is significant. These roads yield about one-ninth of the total railroad earnings of the United States, and doubtless have a much larger proportion of traffic, as most of them are compelled to carry at very low rates.

Earnings and profits are interesting as illustrating the condition of transportation business; but, as a key to the activity of the country at large, a record traffic is much more valuable. Below we give the passenger and tonnage mileage, reported for this chief part of the whole Pennsylvania system (4,175 miles) for the past four years:

Year.	Passenger mileage.	Tonnage mileage.
1875.	582,514,468	3,355,797,075
1876.	582,562,609	3,504,862,558
1877.	543,097,170	3,640,222,819
1878.	540,000,690	4,245,007,808

Passenger traffic follows the general course downward, which we illustrated last week, and freight traffic the general course upward. The freight traffic of these 4,175 miles of exceptionally important roads was 16% per cent. greater in 1878 than in 1877, and 27 per cent. greater than in 1875. The people have not stopped work in the hard times, it seems. They produce and ship, and keep the railroads busy carrying their productions, though they may be too poor to travel.

The control of this vast system of railroads by the direct proprietors of less than one-tenth of it is exercised, as is known, first by the ownership of vast amounts of the securities of the different companies that own some of the roads (the cost of the securities owned by the Pennsylvania Railroad Company is given in its balance sheet as \$66,670,000, which is very nearly as much as the amount of its capital stock), and second by leases on various terms. Thus the company has a large income from the securities which it owns, as well as from traffic, and, on the other hand, has immense amounts to pay as rentals, guaranteed interest, etc. The cash income from its investments is reported as \$1,804,845.65, which is 2.7 per cent. on their cost. Guaranteed interest is paid on the bonds of many companies not included in the system for which earnings are reported, as on the Baltimore & Potomac and the Allegheny Valley railroads and the American Steamship Company; so that, although the net earnings of the 1,055 miles of the Pennsylvania Railroad and Branches (Philadelphia to Pittsburgh) after paying all interest and rentals and other fixed charges of the roads included in that division, were \$6,324,465 in 1878, the surplus, after paying the losses on leased lines and guaranteed interest which became due, was two million dollars less. The surplus net earnings of the Pennsylvania Railroad proper were equal to about 9 1/4 per cent. on the stock. After meeting these losses, they were equal to about 8 1/4 per cent. But of the balance of about \$4,322,000, that was left apparently available for the stock-

holders, no less than \$1,311,000 has been charged off as reduction in value of securities, against accounts charged off as of no value, and for securities transferred to suspense account as of doubtful value. This seems an enormous amount of assets to become worthless in one year; if there are many more of the same kind, the value of the stock will be materially affected by them. The amount charged off in 1878 is nearly enough for a 2 per cent. dividend. However, more than \$10,000,000 was thus charged off in 1877, just about equaling the balance to credit of profit and loss at the beginning of that year, which consisted apparently (as such balances carried down from year to year frequently do) of accounts and other assets that had cost money indeed, but were not worth anything. Thus of the net earnings of the year there remains about \$3,011,000 for the stockholders, which is equivalent to 4.37 per cent. on the capital stock. Only 2 per cent. was actually paid, and a balance to credit of income account was left (including that at beginning of the year) of \$4,057,815. Within the past three years this company has charged off about \$15,000,000 for depreciation in securities, worthless assets, etc.

Our summary of the report will show the course of traffic, earnings and expenses of the grand divisions east of Pittsburgh and Erie worked directly by the Pennsylvania Railroad Company under a single General Manager. Compared with 1877, in the aggregate they show an increase of freight traffic (10 1/3 per cent.), a decrease of passenger traffic (2 per cent.), an increase of 1 1/3 per cent. in gross earnings, a decrease of 3 per cent. in working expenses, and an increase of 9 per cent. in net earnings. There was a decrease of passenger traffic on every one of the three divisions; on the New Jersey lines there was a trifling decrease of freight traffic also, but on "Main Line and Branches" there was an increase of 15.8 and on the Philadelphia & Erie one of 13.6 per cent. (in spite of a considerable decrease of the traffic in anthracite coal, which forms most of this road's west-bound freight).

A great deal of interest attaches to the statements of the average expense per unit of traffic by this company, which have been always, we believe, the lowest for freight reported in this country, and on one of its lines the lowest we have ever found reported in any country. It has appeared heretofore that the limit of the possible had been reached in reducing these expenses; but last year, with the heavier freight traffic, another reduction is reported, and the following figures (cents) are reported for the whole system:

Year.	Passenger mile.			Ton mile.		
	Receipt.	Expense.	Profit.	Receipt.	Expense.	Profit.
1870.	2,056	1,055	1,001	0,915	0,660	0,255
1871.	2,323	1,734	0,530	1,013	0,615	0,308
1872.	2,309	1,712	0,597	0,939	0,545	0,394

This, however, does not give an idea of the extent to which freight expenses have been reduced, for the system includes one division, the New Jersey, on which freight expenses per ton per mile are exceptionally high—more than twice as high as on either of the other divisions—owing to a short haul and heavy terminal expenses. On the "Main Line and Branches" and Philadelphia & Erie, the reported freight expenses are astonishingly low, as shown below:

Year.	Main Line and Branches.			Philadelphia & Erie.		
	Receipt.	Expense.	Profit.	Receipt.	Expense.	Profit.
1873.	1,415	0,857	0,558	1,135	0,985	0,150
1874.	1,255	0,719	0,536	0,941	0,657	0,284
1875.	1,058	0,616	0,442	0,865	0,571	0,294
1876.	0,802	0,582	0,310	0,776	0,504	0,272
1877.	0,980	0,552	0,428	0,786	0,483	0,303
1878.	0,918	0,483	0,435	0,628	0,445	0,183

We believe that nowhere has any such figures for the cost of carrying freight ever before been reported as those above for 1878. On the Main Line and Branches, which is two-thirds branches, and has heavy grades, less than half a cent per ton per mile is reached, and less on the other road. Compared with 1877, even, the reduction is nearly 12 per cent. on one road and 8 per cent. on the other.

Indeed, it is not certain that this does properly represent the whole expense. The road has been in past years put into superb condition and laid with steel throughout; the improvements in working are making it possible to do more and more work with the same stock of locomotives and cars, or as much with fewer. For a long time after the steel track is laid very few renewals become necessary; but none the less the rails are wearing out. Rolling stock worn out may not be renewed, and the remainder still be perfectly adequate to do the old amount of work, or more; but none the less are we then paying maintenance out of capital, and this process must some time come to a sudden stop, and the average renewals be made again yearly. Comparing the general accounts of the Pennsylvania Railroad for 1877 and 1878, we find in the latter year a reduction of 61 in the number of locomotives, of 78 in the number of passenger cars, of 11 in baggage, mail and express cars, of 1,257 in freight cars, against an increase of 191

"road cars," and an increase of \$42,727 in the charge for cost of equipment. Now, all this stock which has disappeared, if new and of standard patterns, would cost something like \$1,200,000. Vice-President Roberts calls attention to this decrease in equipment, without decrease in the charges for it, and says that the present equipment, as now worked, is adequate to do as much as was ever done with the old number, which is doubtless true; and there was, probably, no reason why the missing numbers should have been renewed, not being wanted; but nevertheless maintenance expenses must have been reduced heretofore by permitting this rolling stock to wear out instead of renewing it. Again, the number of tons of rails and the number of ties used in renewals on each division and on the Western lines also are given. On the Main Line and Branches 5,019 tons of steel rails were used. This division with its 1,055 miles of road has about 1,861 miles of track, which, according to reports of weight of rails given, must have just about 100 tons of rails per mile of track. Now, this quantity of rails is equivalent to 2.7 tons per mile, or 2.7 per cent. of the rails, and if this was the average requirement per year, the average life of the rails would be just about 37 years! Now the average life on this road, with more than half its tracks under an extremely heavy traffic, cannot be one-fourth as great. The same calculation shows 2.84 per cent. of the rails renewed on the New Jersey roads, providing for an average life of 35 years, but as much as 14.6 per cent. on the Philadelphia & Erie, which would renew the road in a little less than seven years, and may be somewhat in excess of its average requirements. On the lines west of Pittsburgh the renewals appear to have been at the rate of nearly 10 tons per mile of track, which would renew them every 10 years. On these lines, however, about 30 per cent. of the renewals were made with iron rails.

Now there can be no question but that the Pennsylvania Railroad tracks have been kept in almost perfect condition, but neither can there be any question that 2.7 and 2.84 tons per mile does not begin to provide for the average wear, and that at some time, not far distant, the consumption of rails for renewals must be vastly greater than during the past two years; for not many more rails were used in 1877 than last year.

With regard to ties, the number put in in 1878 would renew those in the Main Line and Branches in about 16 years, those in the New Jersey lines in 12 years, and those in the Philadelphia & Erie in 8 1/4 years. The durability of ties varies greatly with their material and the drainage of the road-bed. In old roads they usually fail in pretty nearly equal numbers from year to year; and when they need to be taken out the time cannot be put off long if the road is to be kept in good condition, as the Pennsylvania always is, whatever else may happen. Still the renewals of 1878 indicate a longer life of tie than we had supposed to be attained in this climate without treatment. The number renewed in 1877 was not much greater, but in 1876 nearly one-fourth more were used.

We call attention to these matters because we believe there is danger in permitting the belief to become established that the cost of transportation is lower than it actually is or is likely to be made under the present circumstances. Such a conviction, which traffic managers are quite likely to share if transportation managers do not, has a tendency to keep down rates, to make the managers undervalue the importance of maintaining rates, and the public impatient of the charges which may be fair or even necessary. It is important that we do not deceive ourselves in this matter, and make our calculations for the future on a basis radically defective.

The East Bound Freight Pool.

The New York apportionment of west-bound freight has been finally modified by an award by Mr. Fink slightly different from his original award—that is, from that made before hearing the objections of the New York, Lake Erie & Western and the Baltimore & Ohio companies. By that, it is understood, the New York Central was to have 36 per cent. of the shipments, the Erie 31, the Pennsylvania 25, and the Baltimore & Ohio 8. By the new and final award, the Baltimore & Ohio has 8 1/2, the Pennsylvania 25, and the 66 1/2 per cent. remaining is divided between the Erie and the New York Central in different proportions of the different classes, the New York Central getting more of the higher classes, and the Erie a larger proportion of the low than of the high classes. This will give it a larger proportion of the total tonnage shipped than the 31 per cent. of Mr. Fink's first award; whether it will yield a larger proportion of the total earnings or not, of course cannot be told without knowing what the

proportions of each class are; but the Erie people seem to be better satisfied with it. This road for some time has had offered it a larger proportion of the low-class traffic, so that it may be said that the award tends to conform with the natural course of the freight. It is not probable, however, that the award will yield anything more than a trifle more earnings than the 31 per cent. first named, especially as the Baltimore & Ohio has had an addition.

This matter was decided at a meeting of trunk-line presidents last Saturday, at which also it was determined to pool the west-bound shipments out of Philadelphia and Baltimore, and to extend the Boston pool so as to cover shipments by all the roads. (Hitherto it has been only on shipments passing to the New York Central and the Grand Trunk.) This will complete the trunk-line apportionment for all the cities which make any considerable sales to the West. It might be supposed that Philadelphia and Baltimore would take care of themselves, the popular impression being that the Pennsylvania has all the Philadelphia business, and the Baltimore & Ohio all the Baltimore business. But this is an error. The Baltimore & Ohio has always had a formidable rival in the Northern Central, and within a year or two both the Erie and the New York Central have established agencies in Philadelphia, and the New York Central one in Baltimore also (working over the Canada Southern and the Michigan Central, and using but a very little of the New York Central). These lines, it is said, have already secured quite a respectable business, and they naturally (there being no pool there) have had a tendency to cause reductions from the regular rates. Now this does not only effect the earnings of all the roads out of Philadelphia and Baltimore, but it exaggerates the agreed differences from New York rates, and thus works against New York merchants. It thus becomes important to pool at all these cities in order to make sure that rates are maintained at all alike.

This matter now goes before the Commissioner, who, after a study of the records of the traffic in the past, will present his recommendations to a future meeting of the trunk-line presidents.

Though the east-bound traffic of Philadelphia and Baltimore for which they compete with New York is quite small, they, and especially Philadelphia, have a very large traffic in goods manufactured in their vicinity, really a species of local traffic. A very large share of this is in heavy articles carried in the lowest classes and at the lowest rates. It is important that these low rates should not be further reduced by the contests of the railroads. The margin over cost is very narrow at best.

Not many years ago the west-bound traffic was not only trifling in amount in comparison with east-bound (as it is still), but it was much more frequently carried at unprofitable rates. Cutting was almost chronic on west-bound freight, and was much less common on east-bound, on which, too, the regular rates were almost always much the highest. Now so far as rates are concerned the position is reversed. West-bound rates are maintained, and on the average are higher than east-bound rates. It is true that east-bound rates are higher for the first and second classes, but this does not amount to anything, for these classes do not make up two per cent. of the total east-bound shipments, while a large proportion of the west-bound is of the higher classes. Just now, for instance, there can be scarcely any profit on the great bulk of the enormous freight traffic coming to the Atlantic ports, but a very fair one on the shipments westward. It is, therefore, encouraging to hear that the westward shipments from New York for the first two months of this year have been as much as ten per cent. greater than last year. And this is encouraging not solely on account of its effect on the railroads which carry this freight, but mainly as an indication of the general condition of business in the country at large. New York shipments go to all parts of the United States, and when for any considerable time there has been an increase in these shipments, it is pretty conclusive proof that there has been an increase in the average ability to purchase for consumption. Owing to the very low prices, this seemed doubtful notwithstanding the enormous and unexampled sales of products, but the returns are said to establish the increase in the westward shipments. It is pleasant to know that there is some traffic which affords paying rates that is increasing. We have had an increasing traffic for many years, but almost universally with decreasing rates. Now, it seems, there is some that grows and still pays.

New York Grain Routes.

There are considerable fluctuations in the proportions of grain carried to New York in the winter months. Those who have followed our annual reviews of the grain movement may remember that for the entire year the Erie took

the lead among railroads until 1873, since which time the New York Central has carried more than any other rail route—in 1877 more than all the other rail routes together. Moreover, the deliveries by the Pennsylvania were a smaller proportion of the whole in every one of the three years ending with 1877 than in any of the three ending with 1874, and smaller in quantity also. It appeared that it was becoming a comparatively unimportant feeder of New York, so far as grain was concerned, and that the Erie was not more than holding its own, while the whole increase of the rail receipts was coming by the New York Central.

The winter receipts do not always agree with the course of the year's receipts, however, and in the last two years there have been remarkable changes, which we purpose to consider below. Figures have been published in the *New York Tribune* for the quantities brought to New York in January and February of 1878 and 1879; but these are insufficient to enable us to trace the course of the traffic, for it is precisely during these two years that the most remarkable changes have occurred.

Below we give the number of bushels and the percentages of the total receipts of grain and flour (reduced to grain) at New York by each route in January and February for the past five years. The receipts are given separately for the two months, for a reason which will appear hereafter.

Receipts of Grain and Flour at New York in January and February for Five Years, by Different Routes.

	1875.	1876.	1877.	1878.	1879.
N. Y. Central.....	1,575,227	2,705,246	902,100	4,669,890	2,530,712
Erie.....	1,322,078	1,649,065	1,118,196	2,073,633	1,57,728
Pennsylvania.....	931,297	674,913	1,025,100	948,73	1,700,394
Other roads.....	128,261	85,316	27,640	106,678	219,212
By water.....	102,397	547,307	901,429	257,350	171,722
Total.....	4,058,404	5,661,747	3,294,485	8,985,533	6,198,396

	FEBRUARY.				
N. Y. Central.....	2,125,691	1,514,356	1,362,361	2,311,924	4,192,787
Erie.....	1,479,390	1,212,140	960,417	2,072,977	2,751,678
Pennsylvania.....	875,063	566,843	781,890	1,024,089	2,338,217
Other roads.....	100,624	112,516	75,150	104,089	21,132
By water.....	236,587	356,988	416,182	248,603	386,003
Total.....	4,819,345	3,702,843	3,076,940	7,470,897	9,892,817
Total two mos.....	8,878,749	9,454,590	6,971,425	16,292,430	16,031,173

	PERCENTAGES.				
January:	1875.	1876.	1877.	1878.	1879.
N. Y. Central.....	38.8	47.8	26.2	50.6	41.2
Erie.....	32.6	29.1	34.0	24.7	24.5
Pennsylvania.....	22.9	11.9	31.1	11.3	27.9
Other roads.....	3.2	1.5	0.8	1.3	3.6
By water.....	2.5	9.7	7.0	3.1	2.8
Total.....	100.0	100.0	100.0	100.0	100.0

	February:				
N. Y. Central.....	44.1	40.7	37.0	52.8	42.4
Erie.....	30.7	32.0	27.1	28.1	27.8
Pennsylvania.....	18.2	14.9	21.3	13.6	23.6
Other roads.....	2.1	3.0	1.0	2.3	2.2
By water.....	4.9	9.4	13.6	3.2	4.0
Total.....	100.0	100.0	100.0	100.0	100.0

First, looking at the totals for the two months, we see that the receipts of 1878 were enormously greater than those of any preceding year, and that those of 1879 have been very nearly as large. The January receipts, however, were 27 per cent. less than last year; the February receipts 26 per cent. greater, and greater than in any winter month previously in the history of the trade. We have then this fact to consider at the outset, that the New York receipts have been large without example during the past two winters.

Now, looking over the receipts by the different routes in January, we find that in 1878 those by the New York Central made an enormous leap forward. They were nearly *six times as large* as in January of the previous year, and comparing with that year, while it gained 475 per cent., the Erie gained but 85 per cent., and the Pennsylvania actually lost. Of the total gain over January, 1877, at New York, 77 per cent. was by the New York Central.

But coming down to January of this year, we find the New York Central has little more than half of its 1878 business, and though this is still three times as much as it had in 1877, it is not so much as its January business in 1876. The Erie, too, has fallen off one-fourth, but the Pennsylvania has increased 90 per cent. and has much larger receipts than in any other January in the table.

In this we trace the effect of two causes, one natural and the other artificial. It is understood that with a snow blockade on the New York Central or the Erie, or both, their deliveries at New York will be decreased, but it seems not so generally apprehended that such blocking of the northern routes forces a larger share of the shipments to New York upon the more southerly Pennsylvania Railroad, which, over the mountains as it is, is much less seldom blocked by snow. Thus we see that in January, 1877, when the New York Central was badly blocked with snow, and carried much less than in the corresponding month of any of the other four years, the Pennsylvania's deliveries were exceptionally large, and the same is the case this year. In 1876 the Pennsylvania delivered less than 12 per cent. of the January receipts; in 1877, more than 31 per cent.; in 1878, when the northern roads were unobstructed, it delivered but 9.3 per cent.; in 1879, when both of the northern roads suffered greatly from the snow, its deliveries were nearly 28 per cent. of the total—more than the Erie's even, which we believe had never happened before.

However, there has been something more than snow at work to change the proportions of the grain carried by the different roads. It certainly did not account for the sudden and enormous increase on the New York Central in January, 1878. It was said then that the contracts and other competition which ruined the value of the winter east-bound freight business in 1878 were for a long time made chiefly on routes that sent their freight over the New York Central, and that the Pennsylvania especially was late to go into the market at the cut rates. Now this is borne out by the figures. Comparing with 1876 (because 1877 was exceptionally unfavorable to some of the roads) we find that in January,

1878, the New York Central had increased its deliveries of grain at New York by 85 per cent., the Erie by 26 per cent., and Pennsylvania by 40 per cent. But in February, when the other roads had got fairly warmed up to the war, the New York Central's deliveries were 17 per cent. *less* than in January, the Erie's 7 per cent. *more*, and the Pennsylvania's 13 per cent. more.

Now this year, the New York Central, interrupted by the snow, has gone back to something like its old proportion; but for the blockade in January, it would certainly have had more that month; but its proportion is but little larger in February, after the snow blockade had ceased, which indicates that there may have been a course of business something like that of 1878—that is, the New York Central's connections first, or most effective at first, in the field of competition, and the other roads "catching up" afterwards. The Erie has got very nearly the same proportion this year as last, both months, and what the New York Central has lost has been gained by the Pennsylvania, which really seems to be making a greater effort to secure New York business. It is noticeable that the receipts by it were larger in February, when the snow blockade could not have had much effect, than in January, when it had a great deal. We may not go far wrong if we conclude that the larger January business was forced upon this road, as it were, but that the larger February business was the fruit of special efforts. And it is worth remembering that in these two months the Pennsylvania Railroad delivered three-fifths as much grain in New York as in the whole year 1877.

All the roads, we may presume, have latterly been doing their best to get a large proportion of the traffic. When the question of a division of the Chicago shipments came up last fall, irreconcilable differences were developed with regard to the proportions which the different lines could command. It is probable that each has been eager to prove that he was right; the question would not be settled by the New York receipts alone, nor by the grain movement alone, of course, and the weather has been an unusual obstacle to the traffic of some of the roads; but any considerable changes at New York, especially if made in February, when there was little effect from the blockade, give some clew to the general distribution and to any special efforts that may have been made to modify it. Since February the proportion of shipments by the Vanderbilt roads has increased again. In all these figures it must be remembered that flour is included with grain, which is not done with our weekly reports of the grain movement. This makes considerable difference, for while there has been a decrease in grain this winter, there has been a large increase in flour.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Denver, South Park & Pacific.—Extended from Grant, Col., west by south to Webster, 3 miles. It is of 3 ft. gauge.

East Line & Red River.—Extended from Winnisboro, Tex., westward to Carrollton, 8 miles. It is of 3 ft. gauge.

This is a total of 11 miles of new road, making 97 miles reported thus far this year.

JANUARY EXPORTS AND IMPORTS illustrate, as the reports of the Bureau of Statistics always do, how much more the import business is concentrated than the export business. Only six places received as much as 1 per cent. and only three as much as 5 per cent. of the imports, New York having 74½ per cent.; but there were 11 places that had each 1 per cent. or more, and five that had 5 per cent. or more of the exports, and New York had but 37.8 per cent. of the total. It has often been said that if a good port establishes good communications with the interior it will secure an export business, and that when this export business has become large this of itself will create an import business, as the vessels which go out loaded will contrive finally to get something to carry back. But this view is not borne out by the facts. New Orleans stands next to New York in value of exports, but its imports are trifling, and New Orleans has been a large exporter for fifty years. So with Savannah and Charleston; they are old exporting cities, but they can hardly be said to import.

In the month of January no less than 95½ per cent. of the total imports were at the five cities of New York, Boston, Philadelphia, Baltimore and San Francisco, and all the cotton ports together did not import 2 per cent. of the total, though they exported 40 per cent. of the aggregate value of exports. A table of the percentage of value of the total imports and exports at each port that had more than 1 per cent. in January will be instructive:

	Exports.	Imports.
New York.....	37.80	74.34
New Orleans.....	18.62	1.30
Savannah.....	6.28	0.02
Baltimore.....	5.76	2.17
Philadelphia.....	5.46	3.90
Galveston.....	4.89	0.40
Boston.....	4.87	7.56
Charleston.....	4.86	0.02
Norfolk.....	3.12	...
San Francisco.....	2.93	7.28
Mobile.....	1.45	0.61

The eleven ports..... 96.04 97.00

These places are arranged in the order of their rank as exporters, but as importers, it will be seen, the order is very different, namely, New York, Boston, San Francisco, Philadelphia, Baltimore and New Orleans.

The great growth of exports from Philadelphia and Baltimore of late years has not resulted in any considerable increase in imports. New York has fully held its own. This should have a bearing in calculating the future of traffic should the improvement of the Welland Canal greatly increase

the grain shipments down the St. Lawrence. All previous experience indicates that this would not be followed by large imports by the same route.

TRANSPORTATION LEGISLATION IN CONGRESS did not amount to much at the last session. There was plenty of important bills, but they did not get through. It was understood that the Senate committee would report in favor of a commission of inquiry as a substitute for the Reagan bill, and this might have been a good thing for all concerned (depending wholly upon the composition of the commission and the nature of their investigation), but we do not hear that any report was made, and if there had been the Senate could not have reached it. A bill changing the law regulating the transportation of cattle passed the Senate, but when it came to a vote in the last moments of the House received but one affirmative vote. The bill authorizing railroad companies to do a telegraph business, which seems not to have been asked for by any railroad, but to have been urged chiefly by certain enemies of the Western Union Telegraph Company, fell through with the army appropriation bill, to which it had been tacked. The bill extending the land grant of the Northern Pacific Railroad was not reached, and no bill was passed granting lands or other subsidies to railroad enterprises, leaving the way free, so far as appears, for people to build as many roads as they please across the continent, which appears to be all that is needed to insure the completion of at least one southern line within two or three years. There does not seem to be any rational objection to continuing the Northern Pacific land grant, however, and probably it will be done some time.

ANGELL is said to be sorry now.

The General Railroad Situation.

[From the advance sheets of the Tenth Annual Report of the Massachusetts Railroad Commissioners.]

So far as the local railroad system of the state is concerned, it is believed that all necessary information in regard to it can be derived from the summary in the earlier portion of this report, and the more detailed statistics which accompany it. The returns made to this Board throw no light, however, on the connection which necessarily exists between the railroad system of the state and that of the country at large. The developments of the year in respect to this have nevertheless been very significant. They have, indeed, touched closely the whole system of communication between Massachusetts and the interior of the country, in a way and to an extent which is not commonly appreciated. It is, therefore, very desirable that some portion of the present report should be devoted to an explanation of the course this development has taken, and the issues involved in it.

In the report of the Board for the year 1876, a detailed reference was made to the severe competition among the railroads of the country, which was one of the marked features of that year. It was, indeed, so severe, that it inevitably led to an almost equally violent re-actionary movement; and, as the year 1876 was noticeable for its railroad competition, the year 1877 was no less noticeable for its railroad combinations. It was the "pooling" year; and during it arrangements for the division of business by competing railroads reached a point of development which had never before been known. These combinations were referred to and discussed at length in the last report of the Board and no further reference to them here seems to be necessary. At the time that report was presented, however, they did not directly affect the business of Massachusetts. The west-bound trunk-line combination, as it was called, controlled and regulated the rates on all merchandise carried out of New York city, but it did not touch New England shipments. Shortly after that report was made this ceased to be the case, and the operation of the trunk-line pool was directly extended, so as to bring within its scope the entire railroad system east of the Hudson. The process by which this result was brought about is easily described.

The trunk-line pool originally included only the Baltimore & Ohio, the Pennsylvania, the Erie, and the New York Central & Hudson River roads. It did not include the Grand Trunk; and, so far as the business of Massachusetts was concerned, an active competition had always existed between that road and the Boston & Albany. As between Boston and Chicago the route of the Grand Trunk was some 13 per cent. the longer of the two, and it was also operated under great disadvantages of climate and of resources. Naturally, therefore, it could not do the through business so cheaply as its more direct competitor; but, nevertheless, it could destroy the value of that business unless it was allowed a share of it satisfactory to itself. To induce business to seek its line, notwithstanding it was the least direct and expeditious, some inducement must be offered. Lower rates were the only inducement which could be offered. It, therefore, for years had claimed that on through business it should, because of its greater distance, be allowed to charge less for the same service than the Boston & Albany, and that such lower charge should not be treated as a "cut." The Boston & Albany declined to accede to this arrangement. It argued that, upon every principle of correct railroad management, the shorter line made the rate, and the longer one accepted it; while to yield this principle involved the absurd concession that, when it came to a trial of strength, the shorter route could not afford to work as cheaply as the longer. Accordingly, for years an intermittent struggle has been kept up between the two lines. As a matter of fact, the Grand Trunk was in the custom of making regular reductions on the Boston & Albany's current rates; but, so long as these reductions were moderate and carefully adjusted, so as not to influence an undue amount of business, they were ignored by the Boston & Albany, and rates were fully sustained. From time to time, however, and, indeed, so frequently as to cause great disturbance in many branches of trade, active hostilities broke out; and then rates from Boston would be reduced until the current of business at all the seaboard points was affected. Not infrequently, therefore, the through rate from Boston to Chicago was materially lower than from New York to that point, and New York shipments had to seek a western outlet through Boston. So long as no combination existed among the trunk lines for the apportionment of the New York business, this condition of affairs might continue. As soon, however, as that combination became effective, it was obvious that it must cease. In other words, the Grand Trunk road became master of the situation, and could practically, through the New York combination, impose its own terms on the Boston & Albany, provided those terms were not wholly unreasonable. This was due to the destructive power which the Grand Trunk now held in its hands. The New York apportionment plan included all the trunk lines, and its whole object was to maintain rates. Rates, however, could not be maintained from

New York if they were materially reduced from Boston. The combination in such a case would have had to meet the reduced Boston rate by an equally reduced New York rate, or the business would have been diverted from the former city to the latter. The whole proportion of Boston business in dispute between the Grand Trunk and the Boston & Albany—that is, the proportion of the business which the Grand Trunk demanded as the condition of its sustaining rates—did not, for the whole year, amount in value to two days of the business out of New York. Under these circumstances, the New York combination was naturally most desirous that the dispute between the Boston roads should be brought to a close. It was also in a position to bring what it desired about. The Boston & Albany had no connection west, except over some one of the trunk lines; in point of fact, it depended for it entirely on the New York Central. As soon, therefore, as the New York pool was formed, the Grand Trunk was at last put in a position in which it could bring so heavy a pressure to bear on the New York Central that that company would be obliged, in self-defense, to compel the Boston & Albany to make the desired concessions; or, if it failed to do so, then the Grand Trunk could demoralize the whole business of the pool, and finally break it up. The value of the New York west-bound business was involved, as well as that of Boston.

A more striking instance could hardly have been afforded of the solidarity, as well as complexity, of modern commercial interests. It was impossible to touch one without touching all. A combination, no matter how powerful, amounted to nothing so long as a single agency able to reach it at any one point was left out of account. In point of value the west-bound business from Boston was computed to be scarcely one-fifteenth part of that of New York; yet the power of touching, through its connections, that one-fifteenth, enabled the Grand Trunk to touch the whole. The necessary pressure was accordingly brought to bear. In January, 1878, there was an active competition for the west-bound Boston business; and again the current of trade was sensibly affected, and began to flow from New York eastward to seek an outlet to the west. The New York combination then exerted itself to bring about an adjustment: as a result of which, the whole matter was by consent left to the Commissioner of that combination as arbitrator. The principle was then at last formally accepted, that in cases of competition for through business between two rail routes, one of which is longer than the other, a concession must be made by the more favored to the less favored route as an inducement to it to sustain rates. Not to do this, it was argued, was to insist upon the less favored line either abandoning all claim on the competitive business, or, through competition, destroying its value to both lines. To ask or expect it voluntarily to abandon the business to its more favored rival, was clearly unreasonable; and, whether unreasonable or not, the request was one which would not be complied with, and which could not be enforced. The alternative was consequently a simple one; it lay between the voluntary concession of a part of the business, or the practical destruction of the value of all of it. The arbitrator accordingly fixed a temporary allowance of 10 per cent. of the entire rate charged, to be allowed in favor of the Grand Trunk, in consideration of which the latter was to sustain rates. Meanwhile, pending a final decision to be reached in the light of more accurate information at a later day, reports of all Boston west-bound business were to be regularly made to the arbitrator, in the same way as those for New York business were made. This was done; and, upon the returns thus made, a final decision was in July rendered, under which competition in rates ceased, and the business was divided on the basis of a fixed percentage of the whole being secured to each route.

This decision was accepted by the companies, and all west-bound business has since been conducted in accordance with it. Complaints on the part of the New York merchants, that lower rates on western shipments were made at Boston than at New York, have ceased; and, so far as the Commissioners are advised, uniform rates from all the seaboard cities have been maintained. Eastern New England thus passed wholly under the influence of the trunk line combination; and, so far as its commerce to the West was concerned, railroad competition for the time being ceased to exist. What effect this will ultimately have is not yet apparent. So far as can now be seen, it simply eliminates the unknown quantity of railroad discrimination from the methods in which business is done. An element of great uncertainty is thus removed. As between the cities of the seaboard, the question is now simply as to which, taking all things into consideration—including natural advantages, wealth, population, wages, intelligence, enterprise, control of plant, and habits of industry—can most cheaply and conveniently supply the demand. It no longer in any degree depends upon fluctuations in rates of carriage, or the temper or personal relations of two freight agents. Up to the present time, no complaints of the working of this arrangement have reached the Commissioners. In this respect they have been disappointed. The arrangement referred to was made in Massachusetts, and was intended to and did control, on the largest possible scale, the operations of Massachusetts roads. Much has elsewhere been alleged against similar combinations, and many laws have been passed, and even constitutional provisions framed, to restrain or prohibit them. In view of these facts, the Commissioners were not without hopes that this combination might be brought to their notice by some action on the part of a portion at least of that business public affected by it. A public discussion of the whole matter must have followed, which could hardly have failed to lead to a better understanding of the details of its operation. From every point of view this seemed to be desirable. As the Commissioners have repeatedly said heretofore, the one really dangerous thing about all these combinations is the secrecy under which they are conducted. No abuse connected with them would long continue, were they more exposed to publicity. However it may be elsewhere, in Massachusetts the laws on this point are explicit, and the powers of this Board ample. On the application of any parties considering themselves aggrieved, or their interests jeopardized, a public hearing would be given by this Board, and the details of this or any similar contract entered into between railroad corporations scrutinized. This has been repeatedly done by the Commissioners, and always, they have reason to believe, with good results. That it is not more frequently done elsewhere, as well as here, is matter for regret. Were there in this country a great many more public investigations into alleged railway abuses, and not nearly so many repressive laws, the condition of affairs would be vastly improved. In the present case, the Commissioners have not felt called upon, though by law clearly authorized to do so, to initiate an investigation of their own motion. So far as they were concerned, the operations apparently made no attempt at concealment during the arbitration; and, at once when the final decision of the arbitrator was reached, a copy of it was privately placed in the Commissioners' hands. They found in it nothing which on its face appeared to them objectionable. As it is of somewhat general interest, a copy of it is herewith submitted.*

Besides thus extending its operations, the trunk-line combination also assumed during the year a new aspect, at least

outwardly, as regards cohesiveness and permanence. At a meeting of those representing these lines, held in New York on the 5th of December last, a formal vote was passed modifying the terms of the original combination, which provided for its termination at any time on three months' notice, and absolutely extending it for a period of five years from the 1st of July, 1879. It scarcely needs to be said that the rock upon which these combinations usually break up is the dissatisfaction of nearly all the parties to them with the proportion of the entire business or receipts which falls to their individual share. As a rule, each is firmly convinced that he is getting less than he ought to have, and less than he would get in the open field of competition. At the 5th of December meeting, an attempt was made to guard against this danger by empowering the Commissioner, on the complaint of any party to the combination, to revise the existing apportionment; and, if the result of his revision was not acceptable to the presidents of the several lines, and they were unable to agree on any different result, the Commissioner should then render a final decision which should be binding on all concerned.

Under certain circumstances, the importance of this action on the part of those representing the trunk lines could not well be overestimated. If it indeed represented a genuine understanding among them, it would afford strong ground for belief that the existing disorganization of the railroad system of the country would shortly cease. The worst feature about that system is the irresponsibility of its present management. Heretofore all the tariff arrangements and business combinations among the railroads of the country—large as well as small—have been the work of subordinates. In no way themselves interested in the ownership of the property, these officers, usually superintendents or freight agents, were chiefly remarkable for the quality known as "smartness," which with them verged usually on a low cunning. As a rule, their highest ambition was to get their "share of the business," and in doing so they were quite indifferent about destroying its value. Capable, energetic, bustling, and with no faith in each other, they made arrangements which they neither expected would be kept, nor intended themselves to keep; and, when not deceiving others, were anxiously watching to see that they were not deceived themselves. Naturally in the hands of subordinates such as have been described, the dealings among railroads became proverbial. The public read notices of combinations and agreements with easy and contemptuous indifference. It knew that they were made only to be broken; and they had been broken so long that the belief had with reason become general, that they never could be, or in any event never would be, kept. The promise of a railroad agent, in a matter of rates, was looked upon as about on a par with the statement of a jockey in a horse-trade. The chief significance of the trunk-line combination, and more particularly of its action on the 5th of December, lay in the possible change indicated in this respect. However incredulous the general business public might be, or slow to recognize the fact, a new order of things had been inaugurated. The men who had now met were not subordinates—unscrupulous and grasping they might be, but they did not pride themselves on "smartness" and cunning; they were responsible, they represented ownership, and they not only respected their own good faith, but they had some confidence in each other. What was of far more consequence even than this, they undoubtedly felt a, with them, extraordinary degree of reliance on the integrity and knowledge of their Commissioner, Mr. Fink. How far these appearances may indicate a thorough and permanent understanding among the parties to the combination, and how far they were assumed to give it an outward aspect of strength, or to hide latent internal dissension, remains to be seen.

Should it be found to reflect a complete understanding and hearty cooperation, its importance could not well be overestimated. The railroad system of the country would be on the verge of a very great change; for undoubtedly it would be in the power of those representing the trunk lines to convert at any time the present New York apportionment system into a railroad clearing-house, on a basis which would admit of indefinite expansion. It would be the old Suffolk Bank system of New England applied to transportation. That such an organization would prove of great value in the development of the general business interests of the country, the members of this Board, at least, entertain no doubt. For some reason, not apparent to the public, the representatives of the trunk lines are evidently not prepared for this decisive measure. Until they are prepared for it, and show a disposition to unreservedly adopt it, there would seem to be no reason for supposing that their combination is more than a mere shell, temporarily held together by a lively recollection of the cost and results of recent conflicts, and by the personal influence and character of one man.

The trunk-line combination regulates the rates on all shipments from the East to the West. What is known as the east-bound freight pool regulates those going in the opposite direction—from the West to the East. As these constitute the vast bulk of the railroad movement, any combination intended to control them is not only of great importance in itself, but the work of organizing it is one of the utmost difficulty. At the time the last report of this Board was presented (December, 1877), a combination of railroads having this object in view had just been formed; its existence was there referred to, and the obstacles which stood in the way of making it effective were briefly suggested (Ninth Annual Report [1878], pp. 76, 77). To these it does not seem necessary now to recur; but, as the growth and development of this combination, its ultimate success or failure, are matters of the utmost concern in a material and commercial point of view to Massachusetts—more so, indeed, than perhaps to any other state in the Union—it is very desirable that its progress should be here observed and somewhat understood.

Encouraged by the degree of success which had attended their efforts to regulate and control the rates on west-bound freight, the representatives of the trunk lines turned their attention, in the latter part of 1877, toward bringing about a similar western combination to control rates on east-bound freight. Accordingly, at their suggestion, a meeting of the officers of a large number of the more important of the railroads east of Chicago and St. Louis, and west of Buffalo and Pittsburgh, was held in New York, on the 17th December, 1877. At this meeting an organization was effected, and an executive committee appointed, similar to the executive committee of the trunk lines. This committee was further directed to employ a commissioner to see that the rates from time to time established were not broken. Through this commissioner all correspondence among the parties to the combination in regard to competitive business was, so far as possible, to be conducted. In case he was unable to adjust any difficulties which might arise, he was to call a meeting of the executive committee, and to submit the matter to their decision. To give some practical effect to the decisions of the executive committee or the commissioner, a recommendation of the trunk lines was further adopted, to the effect that, in case any particular road made reductions from the established rates, then all intermediate roads receiving the goods from them, instead of accepting their *pro rata* proportion of the reduced rate, should charge an arbitrary, and insist upon it until the full rate was restored and maintained. By this process the weight of bearing the entire reduction would be thrown on the road which made it, instead of being

* Not given with the advance sheets that have appeared so far.

distributed among all the roads over which the traffic passed. This, it was believed, was prove a sufficient penalty; and, indeed, such would probably have been the case, had it been practicable to enforce it.

Early in January it became apparent that rates were not being maintained. The trouble arose out of the Milwaukee business. From that city the produce of the West reached the seaboard by either of two routes—the one all rail through Chicago, the other by water across Lake Michigan, and by rail over the Grand Trunk. The Grand Trunk was not at this time a party to the combination, nor did it have any means of its own of reaching Chicago. Accordingly, while the Chicago rate was maintained, that from Milwaukee was cut. The usual result followed. The all-rail lines from Milwaukee through Chicago, in order not to lose the business of the former place, began to compete for it; and speedily their rates for that business to New York were materially lower than their rates for the same business from Chicago. In other words, they discriminated heavily against Chicago and in favor of Milwaukee, on all east-bound business. About that there was nothing exceptional. It is done every day, and as part of a system well understood and defended, as respects a vast majority of local points on the railroads of the country. In these cases, however, it is done against those points and in favor of Chicago, or some other competitive centre. The single peculiarity of the situation was, that the discrimination, usually in favor of Chicago, was now against it. This, however, was a very essential difference. Chicago not only is a point where a great deal of business accumulates, but it makes its voice heard very emphatically through the press and public meetings on any point adversely affecting its interests. It did so now, and the result was soon apparent. The combination showed signs of being shaken to pieces, and complaints began to come in from the more southern lines, that the firm maintenance of rates by them was depriving them of their business. Accordingly, on the 10th of January, another meeting of the representatives of the western roads with those of the trunk lines was held in New York. This, however, resulted in nothing but a recommendation that rates should be restored and maintained, and an agreement that, in case a reduction became necessary, all the roads in the combination would act together in making it. The last was an essential point gained. It was, in fact, the final recognition of a principle of the first importance in any well-regulated system of transportation. The rates from time to time established, whether high or low, reasonable or unreasonable, were to be regular and public rates, made in common, and applicable everywhere. If they were reduced at one point of competition, they were to be reduced at all. In case of a conflict being forced upon the combination at Chicago, when it was met by a reduction there, that reduction was to be proportional and simultaneous everywhere else. If this agreement could be carried into practical effect, it is obvious that it would do away at once with some of the most perplexing and inequitable of those violent fluctuations which, during recent years, have made it impossible to forecast the element of cost in doing business involving distant carriage. It also—and this was far the more important consideration of the two—gave a new influence in regulating and making rates, well nigh incalculable, to the natural as opposed to the artificial channels of communication. This fact is not so generally appreciated as it should be; yet it is one which cannot be overlooked in estimating the probable consequences of any successful railroad combination. Competitive influences before localized will, as the result of this principle, be extended over the widest possible field. Take, for instance, Milwaukee and St. Louis. Both are points touched by the combination. At the former, lake rates to Montreal have to be met; at the latter, river rates to New Orleans. A competitive railroad tariff arranged to meet the lake rate at Milwaukee did not heretofore necessarily affect the rates from any other points; so of a similar tariff arranged to meet the river rates from St. Louis. If, however, the combination acted together, this ceased to be the case. A reduced rate at St. Louis meant a proportionally reduced rate at Chicago. So of every other competitive point. Instead of fluctuating locally, setting at defiance every calculation of the forwarder, the scale would go evenly and generally, up and down, over the entire field. The influence which reduced the rates from Milwaukee would make itself felt in a similar reduction at Louisville; and the work going on at the mouth of the Mississippi would directly affect the winter carriage of grain over the New York Central.

Important as this action was, however, it in itself amounted to little more than the recognition of a principle. Agreements on paper, with no executive force behind them, are of small account. The railroad system to be affected by them is far too complicated, and too much demoralized by years of systematic bad faith, to make it possible that they should result in anything. Cutting, accordingly, went on at all the western points, until rates of 25 cents per hundred were freely made from Milwaukee to New York; and it was evident that the value of the western business, so far as the railroads were concerned, was being destroyed. Then at last a determined attempt at a pooling combination, like that in use in New York, was decided upon. Instead of being fought over, the business was to be amicably divided. Therefore, a meeting of the trunk lines was held on the 30th of January, and their Commissioner was clothed with full authority to use any power they possessed, either morally or by the enforcement of arbitrary local rates on through business, to bring this result about. He at once proceeded to Chicago, where, on 6th of February, he met the representatives of some 30 roads. The desire to effect a combination seemed to be general among them, but a formidable difficulty presented itself in the shape of a great number of time contracts at reduced rates. Some of these, it was known, covered long periods; others, many months. It was obvious, however, that, where business had thus been secured in advance by particular roads at low rates, it could not be divided at regular rates. The commissioners, to whom the whole matter was referred, proposed to overcome the difficulty by assuming these special contracts on the general account of the competing lines. This was satisfactory to all the companies represented but one. As unanimity was of course essential, the objection of this one was fatal to the plan. No other arrangement could be agreed upon, and the meeting therefore adjourned; having accomplished nothing, after notice had been given by the Trunk Line Commissioner that those lines would hereafter be parties to no reductions from the established rates, but would claim their full arbitrary proportion of those rates on all shipments and under all circumstances. Sooner, therefore, than permit the existing competition to longer continue, they threatened to break up the whole *pro rata* method of doing business.

This, it had been supposed, would prove a sufficient executive force. A Western combination was to be brought about, and made effective under a species of Eastern trunk-line protectorate. Nor is there any reason to suppose that this would have been a task difficult of accomplishment, had the trunk lines only been in earnest. In fact, however, merely another illustration was offered of the extreme difficulty with which every step toward the end desired was accompanied. This threat, it was found, amounted to nothing. Under the system of railroad combination and absorp-

tion which has for years been going on, the trunk lines themselves owned or operated a large proportion of the connecting roads which were to be thus disciplined. In enforcing arbitrary rates against them, therefore, they merely enforced them against themselves under other names. They were simply taking money out of one pocket in order to put it in another. The only alternative was for them to insist on their own connections maintaining rates regardless of what others were doing; and, if they did this, they lost the business. It was evident that the desired result could not be brought about in this way. Under these circumstances events had to take their course, and rates fell to a lower point than any yet known, until, in March, they were made as low as two mills per ton per mile. This naturally brought home to all concerned the absolute necessity of another effort to reach an agreement. Accordingly a new meeting was called at New York. It was there shown, from the statistics of shipments, that the proportions of the whole amount of business done by the several companies had not varied greatly in consequence of their competition. They had each done about the same amount as they would in any event have done, only they had done it at a loss instead of at a profit. It was proposed, therefore, at once to agree to divide the traffic at the competing points. In other words, as the east-bound business gathered from the West toward the seaboard, without concentrating at any one point, it was proposed to establish a separate basis of apportionment for all concerned at each of the several points at which it did concentrate. Beyond this the general rates at all points covered by the combination were to be controlled and regulated from the central office of the combination, which was placed at Chicago. It was agreed that the experiment should be tried for a period of three months, and the commissioners were requested to report a detailed plan for carrying it out. This was done, and twelve points were designated at which divisions should be made on a basis of proportions which was settled at a subsequent meeting. Daily reports were to be made to the Commissioner from each of these points, from which condensed statements were forwarded to the competing roads. The usual provision was made to secure an adjustment of questions in dispute.

This scheme went into operation on the 11th of March, and was nominally continued until the 11th of June, when it was abandoned. The difficulty with it lay in the immense complication of the problem to be solved, and the complete absence of any force to compel obedience to the decisions of the Commissioner. He found himself practically powerless. Though abandoned temporarily—however it might be looked upon by the public generally—the scheme was not, among those more particularly concerned, regarded as a failure. Regular returns had been made from the pooling centres, and, though few transfers of freight had been effected under them, a most valuable mass of statistics had been collected. It was found that the entire bulk of business was fourth-class, or that upon which a rate of one per cent. per ton per mile was as high a rate as the roads hoped to maintain; while of the first and second-class business, for the control of which violent and costly struggles had at times taken place, it was found that from Chicago itself these did not average one full car daily. Excluding live stock, the fourth class constituted 98 per cent. of the entire freight movement. In addition to a better knowledge of the facts relating to the business, the process of education, so far as those managing the several corporations were concerned, had also made great progress. They had not only learned to act together, but a very large majority of the more intelligent of them were fully imbued with an honest desire to do so. Nothing more, however, was immediately done, as during the summer the rates by rail were regulated by those by lake and canal. Important conferences were, however, held at Saratoga in the months of July and August, at which the subject was discussed; and at one of these, held on the 22d of August, an important preamble and resolution were unanimously passed, pledging the lines represented to another and more systematic attempt. Accordingly, early in October, the subject was again taken up, and local divisions at certain points agreed upon; but it was not until November and December that those having the matter in charge had sufficiently matured their plans to definitely begin the work. When they did so, it was evident that great progress had been made. The idea of effecting any result through general conventions, resolutions, and agreements left to execute themselves, had long since been abandoned. The idea of sustaining rates through the action of the trunk lines in exacting an arbitrary share in cases of unauthorized reductions had been found impracticable, and was now definitely given up. The experience of the spring had dispelled all faith in the plan of bringing about the desired result through voluntary agreement. Under these circumstances it was now proposed to create a joint executive committee of all the roads, Eastern as well as Western, which should take cognizance of business in both directions, and make a division of it. This committee was composed of a small number of persons; and, where it failed to reach a unanimous decision on any point, such point was to be referred to its permanent Chairman (Mr. Fink), who was to decide the case on its merits, and whose decision was to have the same force and effect as the unanimous vote of the Committee. In point of fact, therefore, all such power as the several corporations through their voluntary agreement can control was at last, as the result of repeated previous failures, concentrated in the hands of one man, to see if he could devise some method of restraining competition. Recognizing the fact that the great obstacle in the way of maintaining rates was the power of cutting them, steps were then taken to concentrate the rate-making power of each road in the hands of one man only, who could be held to a strict responsibility, so that no rates could be changed except by joint action. If the trunk-line representatives had been in earnest, it was unquestionably in their power to have compelled this reform. Had they done so, the root of the difficulty would have been reached. At present the control over railroad charges has been surrendered by those managing the roads into the hands of a swarm of roving freight agents—a species of commercial travelers peculiar to the present day, who are authorized at their discretion to sell their employers' wares at whatever price they see fit. That this should be the case is one of the most curious facts connected with the American railroad system; and yet it is indisputable. Were it not so, it would be thought incredible. It is surprising enough that those owning railroads should thus recklessly abandon to men of no responsibility the power of giving away their services; but it is still more surprising that the business community sustains itself under such circumstances. The first principles of law governing common carriers are habitually violated. Special contracts covering long periods of time are made every day with heavy shippers, under which the common carrier, whose first duty is to serve all equally, gives to certain parties a practical control of the markets. There is thus neither equality nor system—law nor equity—in the matter of railroad charges. A complete change in this respect is a condition precedent to any just and equitable system of railroad transportation, as it is to any successful east-bound combination. The rate-making power must be confined to few and trustworthy hands. Whether those directing the present attempt at a combination will be able to bring this about remains to be seen. Certainly they have not succeeded in doing so

hitherto; and, except at certain points, railroad competition in the interior is now as active and uncontrollable as it has ever been. The demoralization is apparently too deep to be reached by any remedies which have yet been devised. The fact would seem to be that the Western combination is a mere reflection of the Eastern; and, if that is a shell, the other is but its shadow.

Nevertheless it is indisputable that, whether it results in temporary failure or not, the attempt to create an organized federation of railroad corporations to restrain competition is now being made. It is also for the first time being made under conditions which make success possible. Those who, judging by the experience of the past, look upon the project with indifference, and predict for it the speedy and complete failure which has befallen all similar previous experiments, are certainly mistaken. That it will now succeed, much less result in all that those who have projected it hope for, is altogether improbable. The effort, however, is intelligent, systematic and persistent. Though it would, of course, be wholly premature to now attempt to forecast the result of this effort if it should be even partially successful, it is quite apparent that the form it has hitherto assumed is not its permanent form, and that it must undergo very considerable development, probably as the result of renewed hostilities, before it can arrive at any real consistency. The tendency, however, is distinctly toward a railroad clearing-house system, such as has already been suggested, with general powers in relation to the establishment of rates and the distribution of business. The difficulties in the way of this are of the most complicated character—so complicated that they can be overcome only as the result of repeated failures. It is, however, this very fact that assures the safety of the public interests. No combination, apparently, is possible which does not contain ample provision against anything like extortion. It has got to be public and responsible, and will unquestionably be directly subject to legislation. That when it comes it will prove in its ultimate shape a vast improvement on what now exists, is probably questioned by no one who has given any thoughtful consideration to the subject.

Without, however, undertaking to philosophize on the possibilities of the future, it is apparent that the course of events which has been referred to has a very close bearing on the immediate railroad connections of Massachusetts. During the year the several combinations have brought the state directly and entirely within the scope of their operations. For the time being all the railroad intercourse between Massachusetts and the interior—East or West—is conducted under an agreement for the division of business between carriers. While the effect of such an arrangement is certainly matter for careful consideration, the Commissioners, for reasons which they have heretofore endeavored to set forth in their reports, see no cause for apprehension. Massachusetts, and Boston in particular, would seem, of all the sea-board communities, to have least to fear and most to hope from the effect of combinations such as have been described. Alone of those communities we have no independent through line of communication of our own with the West. However it may heretofore have been, under exceptional circumstances and for brief periods, in the long run active competition between the through routes cannot but be prejudicial to Massachusetts' interests. It leads directly to discrimination in favor of rival communities. It does so for the obvious reason, that, as a rule, railroad competition is, and must continue to be, stronger to New York, Philadelphia and Baltimore than to Boston. They are all of them not only nearer the interior, but they each of them have through lines exclusively controlled in their own interests. When the law of the strongest is at work through active competition, it certainly does not work in our favor; and we cannot permanently steal business. If the Boston & Albany road could now be consolidated with the New York Central & Hudson River, the position of affairs might perhaps be altered. Boston would then be the direct eastern terminus of a great thoroughfare, those controlling which would be under a heavy inducement to direct all the business they could this way, as giving them what is known as the "long haul" on it. They would get a *pro rata* proportion of fifty miles, or 11 per cent., more on Boston business than on New York. In the close way in which railroad transportation is now done, this would be almost a controlling consideration. Such a consolidation, therefore, would not improbably be as conducive to the increased prosperity of this section as any measure which could now be suggested. For this, however, public opinion is as yet scarcely well enough informed. Indeed it is not improbable that the mere suggestion of it will be looked upon as visionary, if not denounced as in some way unpatriotic. There is a vague, but nevertheless deeply-rooted, impression in the public mind that something is gained or assured to the state by keeping its railroads as much as possible disconnected from the larger lines of other states. From a business point of view, this is wholly fallacious. New England is altogether too large and valuable a field for the owners of any railroad to neglect; and the probable result of a consolidation such as that suggested would be that Boston would become a principal terminus of a line five hundred miles long, instead of, as now, the terminus of one but two hundred miles long. It would, in fact, rather take possession of by that road. Geographical considerations, which with railroads are always in the end the ruling considerations, would tell heavily in its favor. It would always offer both the long haul and the short ocean carriage.

Until, however, through some such measure of consolidation as has been suggested, Massachusetts can be placed in direct dependence upon and sympathy with a through railroad line to the interior, it has more to fear from uncontrolled railroad competition than any other seaboard community. Considering the wealth, population, acquired skill and facilities for commercial exchanges which now exist here, it would seem too evident for argument that what the people of the state most need in respect to transportation is certainty; that its cost should be not only reasonable, but constitute a fixed and easily ascertainable element in every business transaction. Their interests would seem to demand that traffic should be permitted to flow, and interchanges be made, just how and where the requirements of buyer and seller may dictate, with no discrimination, and as free from fluctuations as circumstances will permit. This cannot be so long as unregulated railroad competition, such as the country has witnessed during the last few years, shall continue. The prospect that this may be brought to a close, even through a great combination of railroads, therefore, excites no alarm in the members of this Board. That such a combination, if it should prove practicable, would result in many abuses of its own, would seem not improbable. The Commissioners, however, entertain no doubt that these will be met and corrected with far less trouble than is commonly supposed. The idea of state supervision of railroads has of late made quite as rapid a progress in the public mind as is desirable, and its principles at last are beginning to be understood. The leading authorities among the railroad men—those now guiding its policy of combination—are fully prepared to accept it, and only ask that it may be intelligent. Under these circumstances, in the present general aspect of the railroad question either at home or throughout the country, so far as the public is concerned, the Commissioners are

unable to see any occasion for solicitude. The outlook from the stockholders' point of view is, perhaps, less encouraging.

CHAS F. ADAMS, JR.,
A. D. BRIGGS,
BOSTON, Dec. 26, 1879. E. W. KINSLEY.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Pennsylvania, annual meeting, in Musical Fund Hall, Philadelphia, March 11, at 10 a.m.

Nashua & Rochester, in Nashua, N. H., March 22, special meeting to consider proposed reduction of rental of the road.

Railroad Conventions.

The *Car Accountants' Association* will hold its next annual convention in Chicago, April 23. The Grand Pacific Hotel has been chosen as headquarters, and special rates will be given to members and their families. All railroads and fast freight lines are invited to send representatives to the meeting.

The *General Passenger and Ticket Agents' Association* will hold its regular semi-annual meeting at the Metropolitan Hotel, New York, March 14.

Dividends.

Dividends have been declared as follows:

New York & Harlem, 3 per cent. from the earnings of the city line, payable April 1. This is addition to the 8 per cent. dividend paid by the lessee, and makes 11 per cent. for last year.

Mail Service Extensions.

Mail service has been ordered on railroad lines as follows:

Denver, South Park & Pacific.—Service extended from Grant, Col., to Webster, 3.2 miles.

Monterey & Salinas Valley.—Service ordered from Salinas City, Cal., to Monterey, 21 miles.

Foreclosure Sales.

The *Bradford & Foster Brook* road was sold at sheriff's sale in Bradford, Pa., Feb. 21, and bought by Dr. E. P. Allen. The road is about six miles long, and is a single-rail elevated road on the Roy Stone plan. It has not been successful so far, chiefly from the difficulty of getting a suitable locomotive. The purchaser intends to organize a new company and extend the road.

The *Philadelphia & Atlantic City* road will be sold May 29, under an order just granted by the Chancellor of New Jersey, for the benefit of the creditors. The road is of 3 ft. 6 in. gauge and 54 miles long, from Camden, N. J., to Atlantic City. It was built to compete with the standard-gauge Camden & Atlantic road, but has not been successful. The only published statement is for the year 1877, when the road had been worked about five months: there was then \$300,620 stock, \$230,000 bonds, and \$300,900 floating debt. The road was very cheaply and hurriedly built, and has never been really finished.

Southwestern Railway Association.

At the regular monthly meeting in Chicago, Feb. 26, the subject of a method of arbitration, in case arbitration should be necessary on any point, was discussed at some length, and action was postponed until the March meeting in St. Louis.

A delegation of lumbermen was present for the purpose of stating the injury the present rates are doing to their business in keeping lumber back from market. Action on this matter also was postponed to the March meeting.

Changes in the east-bound tariff of Feb. 10 have been made which went into effect March 1, as follows:

The rate on fourth-class freight and cured meats, which was and remains 20 cents per 100 lbs from Missouri River points to St. Louis and other Mississippi River points, is reduced 1 cent to Chicago, Milwaukee and Toledo, namely, to 25, 27½ and 35. The live-stock rate, remaining unchanged at \$50 per car-load for cattle and \$40 for hogs to St. Louis, is reduced \$5 per car-load on cattle to Chicago, to \$57.50, and \$10 on hogs, to \$47.50.

Southern Association General Passenger & Ticket Agents.

At the regular meeting of this Association in Atlanta, Ga., Feb. 27 and 28, the subject of extra baggage was taken up. It was decided to follow the Central and Western Associations in fixing 150 pounds as the limit of baggage to be carried free for each full ticket, and to rigidly exact payment for all baggage in excess of that weight.

The question of excursion rates was discussed, and also the question of a general form of contract to be used for such tickets. There was a general exchange of views, but no definite action was taken.

West-Bound Pool Meeting.

A dispatch from Philadelphia, March 5, says: "The Executive Committee of the trunk lines met at the Continental Hotel to-day and fixed the preliminaries of the new pool on west-bound freight from this city. It has already taken effect, dating from March 1. All the afternoon was consumed in arranging the details and the percentages will be announced as soon as the Commissioner can determine them. Opinions differ very widely as to the percentages to be allowed, and nothing will be known probably until they are agreed upon for Boston and Baltimore. All the four lines get to Boston in some way, but Baltimore has no Baltimore connection. It was suggested to-night that the Pennsylvania road would demand 60 or 65 per cent. from this city, the remainder to be equally divided among the other three lines."

"Among those present were J. H. Rutter, General Traffic Manager of the New York Central; George R. Blanchard, Vice-President, and R. C. Vilas, of the Erie; A. J. Cassatt, Vice-President of the Pennsylvania; Albert Fink, Trunk Line Commissioner; William H. Smith, of the Baltimore & Ohio."

ELECTIONS AND APPOINTMENTS.

Atchison & Nebraska.—The office of General Freight and Ticket Agent has been abolished, and all communications for that department should be sent to L. W. Towne, General Superintendent, at Atchison, Kansas.

Atchison, Topeka & Santa Fe.—Mr. John N. Woods has been appointed Chief Train Dispatcher. He has been for 12 years past Train Dispatcher at Aurora for the Chicago, Burlington & Quincy.

Cairo & St. Louis.—Mr. G. B. Simonds, formerly of the Hannibal & St. Joseph, has been appointed Superintendent of Machinery of this road.

Chicago & Alton.—Mr. Joseph H. Wood is appointed Superintendent of the Jacksonville and Missouri divisions,

in place of Mr. C. M. Morse, resigned. Until further notice Mr. Wood will continue to perform the duties of Supervisor of Maintenance of Way, at Bloomington, Ill.

Chicago, St. Louis & New Orleans.—At the annual meeting in New York, March 5, the following directors were chosen: J. C. Clark, Adolph Schrieber, New Orleans; W. A. Gordon, of Mississippi; James Fentress, R. P. Neely, of Tennessee; G. W. Paschal, of Kentucky; B. F. Ayer, W. K. Dickenson, Chicago; James Emott, Stuyvesant Fish, W. H. Osborn, L. V. F. Randolph, New York. The road is controlled by the Illinois Central.

Cleveland, Columbus, Cincinnati & Indianapolis.—At the annual meeting in Cleveland, O., March 5, the following directors (one-third of the board) were chosen: J. H. Devreux, H. B. Hurlburt, S. Burke, Cleveland; H. J. Jewett, James R. Keene, New York. Mr. Keene is the only new director, succeeding F. S. Leland.

Connecticut Railroad Commission.—The Governor of Connecticut has nominated Gen. Francis A. Walker as Railroad Commissioner, but he has not yet been confirmed. Gen. Walker was Superintendent of the last United States Census, and is a man of the highest ability.

Dallas & Wichita.—The new board of directors is as follows: W. H. Gaston, A. F. Hardie, W. R. McEntire, M. Pointer, H. S. Earvy, Dallas, Tex.; T. B. Abney, Denton, Tex.; Silas Reed, Boston.

Dubuque & Sioux City.—At the annual meeting in Dubuque, Ia., Feb. 11, the following directors were chosen: Lorenzo Blackstone, Stephen Harriman, Abram S. Hewitt, J. Pierpont Morgan, James A. Roosevelt. The road is leased to the Illinois Central.

Dubuque Southwestern.—At the annual meeting in Dubuque, Ia., Feb. 11, the following directors were chosen: John W. Cary, W. S. Gurnee, S. S. Merrill, Alexander Mitchell, Julius Wadsworth. The road is controlled by the Chicago, Milwaukee & St. Paul.

Duluth, Iowa & Dakota.—The first board of directors is as follows: Edward Larsen, Ole Peterson, A. A. Brown, E. P. Barnum, P. J. Kniss, Gorham Powers, Ole N. Barsness, A. M. Stiles, John C. Riebe. Office at Benson, Swift County, Minn.

Graysville & Mattoon.—The new Receiver, E. B. Phillips, has appointed C. S. Anthony, Auditor; H. H. Riddell, General Freight and Passenger Agent; S. W. Anderson, Roadmaster.

Housatonic.—At the annual meeting in Bridgeport, Conn., Feb. 28, the old board was reelected, as follows: W. D. Bishop, Horace Nichols, Bridgeport, Conn.; A. B. Mygatt, New Milford, Conn.; George W. Peet, Falls Village, Conn.; Wm. H. Barnum, Lime Rock, Conn.; David S. Draper, Great Barrington, Conn.; Edward Leavitt, John B. Peck, Samuel Willetts, New York.

Illinois Midland.—Mr. Day K. Smith has been appointed Master of Transportation in place of C. J. McPherson, resigned. Office at Paris, Ill.

Kansas Central.—Levi Wilson, General Freight Agent, has been appointed General Ticket Agent also.

Lawrence.—At the annual meeting in Pittsburgh, Feb. 28, the following directors were chosen: George W. Cass, John B. Jackson, Thomas D. Messler, J. N. McCullough, Pittsburgh; A. L. Crawford, R. W. Cunningham, New Castle, Pa.; W. R. Parmalee, Cleveland, O. The road is leased to the Pennsylvania Company.

Mankato & St. Cloud.—The first board of directors is as follows: N. P. Clark, C. A. Gilman, John A. Willard, J. H. Baker, Horace Cummins, W. T. Bonniwell, Jacob Koher, W. M. Campbell, H. Stevens. Office at Mankato, Blue Earth County, Minn.

Memphis, Kansas & Colorado.—This company has been entirely reorganized and the following directors chosen: F. C. Manning, Winfield, Kan.; G. W. Brown, A. M. Dennis, L. Manlove, Cherokee, Kan.; C. W. Mead, Omaha, Neb.; Geo. Greene, J. P. Messer, Jas. G. Hill, C. S. Bennett, Cedar Rapids, Ia. The board has elected George Greene, President; C. W. Mead, Vice-President; C. C. Bennett, Secretary and Treasurer; J. P. Messer, Superintendent.

Memphis & Little Rock.—At the annual meeting in Little Rock, Ark., Feb. 15, the following directors were chosen: Wm. Black, B. C. Brown, R. K. Dow, James Harrington, J. W. Wynne. The board reelected R. K. Dow, President; Rudolph Fink, General Manager; John W. Goodwin, Secretary and Treasurer.

Missouri Pacific.—The new board, chosen March 5, has reflected C. K. Garrison President; Oliver Garrison, Vice-President; George L. Gerau, Treasurer; A. A. Talmage, General Superintendent.

Montpelier & Wells River.—At the annual meeting in Montpelier, Vt., Feb. 26, the following directors were elected: W. H. Bingham, Joel Foster, Jr., Montpelier, Vt.; S. S. Thompson, Lyndonville, Vt.; D. R. Scottwell, East Cambridge, Mass.; E. C. Sherman, Boston. The Board elected R. D. Scottwell President; S. S. Thompson, Vice-President; Joel Foster, Jr., Clerk and Treasurer.

Northern Central.—At the annual meeting in Baltimore, Feb. 27, the following directors were chosen: B. F. Newcomer, S. M. Shoemaker, George Small, Baltimore; Wm. Calder, J. N. Hutchinson, Wistar Morris, Dell Noblitt, H. M. Phillips, George B. Roberts, Thomas A. Scott, M. B. Sellers, Edmund Smith, Philadelphia. The only new director is Mr. Calder, who succeeds Mr. S. M. Felton. The board reelected Thomas A. Scott, President; A. J. Cassatt, Vice-President; John S. Leib, Treasurer; Stephen W. White, Secretary; John Crowe, Auditor; John W. Davis, Assistant Secretary and General Agent.

Northern (New Hampshire).—The board has elected Josiah Minot, of Concord, N. H., President, in place of Onslow Sterns, deceased, and George A. Kettell, of Boston, Treasurer, in place of Mr. Minot.

St. Louis, Kansas City & Northern.—The new board, chosen March 4, has reelected B. W. Lewis, Jr., President; James F. How, Vice-President and Secretary; R. D. Kohn, Treasurer; Thomas McKisock, General Superintendent.

Sheboygan & Fond du Lac.—At the annual meeting, March 1, the following directors were chosen: Elihu Colman, A. G. Ruggles, Fond du Lac, Wis.; Edwin Slade, Glenbeulah, Wis.; J. Thompson, Princeton, Wis.; E. Mariner, Milwaukee, Wis.; R. G. Rolston, Moses Taylor, New York. The board elected A. G. Ruggles, President and Treasurer; Edwin Siade, Vice-President and Secretary.

Taylor's Falls & Lake Superior.—At the annual meeting in Taylor's Falls, Wis., Feb. 19, the following directors were chosen: L. W. Folsom, Caspar Hauser, J. F. Owens, Oscar Roos, H. N. Setzer, G. W. Seymour, J. L. Taylor. The board elected L. W. Folsom, President; G. W. Seymour, Treasurer; Edwin Siade, Vice-President and Secretary.

Secretary; Caspar Hauser, Treasurer; H. N. Setzer, Attorney.

Troy & Boston.—Mr. A. W. Hobart has been appointed Superintendent. The office has been vacant some time, Vice-President Robinson having performed its duties since the death of Mr. C. W. Moseley.

Troy & Greenfield.—The Governor and Council of Massachusetts have appointed G. Clinton Gardner Manager of this road (which includes the Hoosac Tunnel), in place of Jeremiah Prescott. Mr. Gardner is now General Superintendent of the Pennsylvania Railroad Division, Pennsylvania Railroad, and it is not yet known if he will accept.

Union Pacific.—At the annual meeting in Boston, March 5, the following directors were chosen: Sidney Dillon, Russell Sage, Solon Humphreys, Jay Gould, David Dowd, James R. Keene, Addison Cammack, New York; F. Gordon Dexter, Elisha Atkins, E. H. Baker, Frederick L. Ames, Boston; W. L. Scott, Erie, Pa.; S. H. H. Clark, Omaha, Neb.; W. A. Loveland, Golden, Col.; John Sharp, Salt Lake, Utah. The board reelected Sidney Dillon President; Elisha Atkins, Vice-President; Henry McFarland, Secretary and Treasurer; O. W. Mink, Assistant Secretary and Treasurer.

Wabash.—The new board has reelected Cornelius K. Garrison, President; A. L. Hopkins, Vice-President and General Manager; W. B. Corneau, Secretary and Treasurer.

Warren & Bradford.—Mr. Thomas Struthers, of Warren, Pa., has been chosen President.

PERSONAL.

—Mr. C. J. Ives, Superintendent of the Burlington, Cedar Rapids & Northern road, and his wife, celebrated their silver wedding at their residence in Cedar Rapids, Ia., Feb. 20. A number of the officers and employés attended and presented Mr. and Mrs. Ives with a valuable silver tea-set and a case containing silver knives, forks and spoons. The presentation was made in a very neat and complimentary speech by Auditor J. C. Brooksmit, and Mr. Ives responded in appropriate terms. A congratulatory telegram was received from the President of the company in New York, and the occasion was much enjoyed by those present.

—Mr. Wm. Ross, who died in Providence, R. I., Feb. 29, aged 78 years, was one of the oldest railroad men in New England. Early in life he was connected with the chief stage line between Boston and Providence, but left it as soon as the Boston & Providence road was built and sold the first tickets over that line. He also sold the first tickets over the Providence & Stonington road, was for some years a conductor on that line, and afterward for several years Superintendent of the Long Island road, when it was first opened to Greenport. For many years he has been retired from active business and lived in Providence, where he was well known from some eccentricities of dress and manner he indulged in, but was nevertheless a useful and valued citizen.

—Charles W. Angell, the Secretary who robbed the Pullman Palace Car Company, has been finally disposed of by a sentence of 10 years in the State Prison at Joliet, Ill., the longest term authorized by the laws of Illinois. He made no defense, but pleaded guilty, and the trial occupied a very short time.

—Sell Howell, General Southern Passenger Agent of the Piedmont Air Line, was shot and instantly killed in a street fight in New Orleans, Feb. 25, by A. T. Wimberly, of Covington, Miss. Wimberly was badly wounded by a shot from Howell's brother, who was with him.

—Mr. Henry Williams, who died in Milwaukee, Wis., Feb. 22, was one of the pioneers of that city, and was one of the projectors and for several years a director of the old Milwaukee & Watertown Company. He was 73 years old.

—Major P. P. Dandridge has resigned his position as Chief Engineer of the Baltimore & Delta Railroad.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Month of November: 1878. 1877. Inc. or Dec. P. c.

N. Y., Lake Erie & Western..... \$1,381,391 \$1,570,943 D. \$189,552 12.1

Net earnings..... 518,081 608,354 D. 90,273 14.8

Two months ending Feb. 28:

St. Louis, Iron Mt. 1879. 1878. 1877. \$671,270 \$716,840 D. \$45,570 6.4

St. Paul & Sioux City..... \$309,121 \$298,976 I. \$10,145 3.4

City..... 46,724 40,467 I. 6,257 15.4

Sioux City & St. Paul..... 21,048 25,908 D. 3,960 15.3

Southern Minnesota..... 37,151 60,016 D. 22,865 38.1

Month of February:

St. Louis, Iron Mt. & Southern..... \$339,950 \$341,318 D. 61,368 0.4

Month of January:

Atlantic & G. Western..... \$309,121 \$298,976 I. \$10,145 3.4

St. Paul & Sioux City..... 46,724 40,467 I. 6,257 15.4

City..... 21,048 25,908 D. 3,960 15.3

Southern Minnesota..... 37,151 60,016 D. 22,865 38.1

Month of February:

St. Louis, Iron Mt. & Southern..... \$339,950 \$341,318 D. 61,368 0.4

Third week in February:

Hannibal & St. Joe..... \$33,968 \$31,024 I. \$2,944 9.5

Week ending Feb. 22:

Grand Trunk..... \$173,358 \$172,382 I. \$976 0.6

Cotton.

For the week ending Feb. 28 and the crop year from Sept. 1 to that date receipts at shippers' ports are reported as follows by the *Commercial and Financial Chronicle*:

1879. 1878. 1877. 1876. 1875.

Week..... 110,047 94,349 68,015 86,215 77,268

Crop year..... 3,830,564 3,579,054 3,571,507 3,491,142 2,661,527

Of the receipts of the week this year 42 per cent. were at New Orleans.

The exports for the week and crop year were:

1879. 1878. Inc. or Dec. P. c.

Week..... 118,333 148,905 D. 30,572 29.5

Crop year..... 2,490,325 2,224,220 I. 266,105 12.0

Of the exports of the week 61½ per cent. were from New Orleans this year.

Grain Movement.

Receipts and shipments of grain of all kinds for the week ending Feb. 22 are reported as follows, in bushels, for the past six years:

Northwestern Atlantic

Receipts. Shipments. Receipts.

Year. 1874. 1,577,633 772,701 1,996,577

1875. 1,959,010 495,562 1,775,229

8.8 at New Orleans, 1.1 at Portland, and 0.1 per cent. at Montreal.

For the 12 weeks since November the movement this winter compares with that last winter—incomparably the largest ever known—as follows:

	1879.	1878.	Incr. or Decr.	P. c.
N. W. receipts	38,023,952	30,820,812	I. 7,203,140	23.4
" shipments	17,452,553	19,617,823	D. 2,165,290	31.0
Atlantic receipts	37,830,395	30,702,732	D. 1,872,337	4.7

The tendency is to some increase in the shipments of Northwestern markets and to a large increase in the receipts at Atlantic ports. The latter now bid fair to equal or surpass those of last year, in the course of a few weeks. The moderate receipts at Northwestern markets will not prevent this, for there is now in store more than the railroads ever carried from them in two months, and besides most of the receipts at the Atlantic at this time of year do not come from these markets; in the 12 weeks the Atlantic receipts have exceeded the eight Northwestern markets' shipments by 20,400,000 bushels, or 116 per cent.

Baltimore grain receipts for February were as follows:

	1879.	1878.	Incr. or Decr.	P. c.
Flour, barrels	112,726	86,164	I. 26,562	30.9
Wheat, bushels	1,487,206	921,243	I. 565,963	61.4
Corn	2,776,629	2,610,585	I. 1,166,044	72.4
Other grain	118,314	120,196	D. 1,882	1.6
Total grain	4,382,149	2,652,024	I. 1,730,125	65.2

Total, flour reduced to bushels..... 4,945,779 3,082,844 I. 1,862,935 61.2

For the two months ending Feb. 28 the receipts were as follows:

	1879.	1878.	Incr. or Decr.	P. c.
Flour, barrels	160,519	202,379	D. 2,860	1.4
Grain, bushels	7,444,341	5,271,167	I. 2,173,174	40.2

Total, bushels..... 8,441,936 6,283,062 I. 2,158,874 34.4

Exports for February included 54,830 barrels and 3,866,153 bushels grain, a large increase over February of last year.

San Francisco receipts for the week ending Feb. 22 were 6,633 barrels flour, 240,950 bushels wheat, 23,865 bushels barley, and 7,101 bushels other grain; total, reducing flour to wheat, 305,081 bushels.

Coal Movement.

Coal tonnages reported for the week ending Feb. 22 were:

	1879.	1878.	Incr. or Decr.	P. c.
Anthracite	361,486	252,078	I. 100,408	43.4
Semi-bituminous	42,798	35,860	D. 6,938	19.3

The Grand Trunk Railway Company has placed its coal contracts for 1879, taking 90,000 tons American coal, 70,000 tons at International Bridge (Buffalo), 10,000 tons at Belleville and 10,000 tons at Detroit, at a price said to be \$2.63 per ton. The 40,000 tons to be delivered at Montreal will come from the Albion Mine, Picton, N. S., at a price under \$3.50 per ton, *ex ship*, to Montreal.

The coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the two months ending March 1 was:

	1879.	1878.	Incr. or Decr.	P. c.
South Amboy for shipment	43,027	102,065	D. 58,138	56.9
Local distribution on N. J. lines	51,064	25,746	I. 24,918	93.3
Company's use on N. J. lines	15,055	14,246	I. 809	5.7
Total	110,646	143,057	D. 32,411	22.0

Of the total this year 77,682 tons were from the Lehigh and 32,964 tons from the Wyoming Region.

A Philadelphia dispatch, of March 5, says: "President Gowen, of the Reading Railroad Company, was to-day questioned on the subject of a new coal combination, and denied that he had identified himself with any recent movement looking to restriction of production, or that he had made any effort to induce the withdrawal of the announcement by the Delaware & Hudson Coal Company of their sale by auction. The only foundation he could ascribe for the statements was the fact that he had on several occasions written and telegraphed to the New York companies that he was willing to be the first to advance the price of coal if they would agree to follow the advance that the Reading Company would make. The present low prices were not due to any overproduction."

Ocean Freights.

At San Francisco freights are reported firmer and quotations are 40s. per ton for wooden vessels, or 42s. 6d. for iron vessels to load wheat for Liverpool or Havre. Ship-owners are encouraged by the prospect of a good crop this year, and are holding off for better rates. On Feb. 22 there were in port vessels having a capacity of 31,719 tons loading, and 48,782 tons disengaged. The disengaged tonnage was the smallest for some time.

Chicago Shipments.

A telegram from Chicago dated March 4 says: "The east-bound freight movement during the past week has been considerably larger than for some time. The Vanderbilt roads are again taking new business. This is specially the case with the Michigan Central, which has gained wonderfully in the amount of freight carried during the week, and the figures show it to be again at the head of the east-bound roads. The total percentages were as follows: Michigan Central, 34.1; Lake Shore & Michigan Southern, 23.2; Pittsburgh, Fort Wayne & Chicago, 29.5; Pittsburgh, Cincinnati & St. Louis, 8.7; Baltimore & Ohio, 5.5."

The increase of business is probably due to lower rates, the basis of those current being understood to have been, for some two weeks, about 20 cents per 100 lbs. for grain and 25 for provisions from Chicago to New York, with the usual differences of two cents in favor of Philadelphia and three cents in favor of Baltimore.

RAILROAD LAW.

Injury to Employee—Negligence.

In Lynch against the Pennsylvania Company, the Illinois Supreme Court held as follows:

1. In an action by an employee for injuries received by reason of defective appliances for carrying on the work furnished by the employer, due care and caution, on the part of the employee to avoid the injury is an indispensable element to his right to recover.

2. If he has full knowledge of all the perils of a particular service, he may decline to engage in it, or require that it shall first be made safe, but, if he does thus enter it, he assumes the risks and must bear the consequences.

3. Where the defects in the machinery or other appliances are as well known to the servant as to the master, the servant must be regarded as voluntarily incurring the risk resulting from their use, unless the master, by urging on the servant or coercing him into danger, or in some other way, contributes to his injury.

The Court reversed the judgment of the lower court, and held that plaintiff could not recover damages for his injury.

Municipal Regulation of Railroads.

In the case of the town of East Orange against the Delaware, Lackawanna & Western Company, the Town Committee passed an ordinance requiring the company to place flagmen and lampmen at the crossings of certain streets, some of which were opened since the railroad was constructed, under a penalty for non-compliance. The company objected so far as the streets opened since the road commenced to run are concerned. The New Jersey Supreme Court decides substantially in favor of the town, saying, in effect, that while it is claimed that the township had no power to pass the ordinance in question—that the Legislature could not grant it such power—it cannot be said that the railroad company owe no duty to the public. While they were only required to provide the means of safety necessary at the time of the construction of their road, the public have the right to lay roads over the track and all persons traveling over them are entitled to protection. After the construction of a railroad new conditions may be imposed upon its owners by a new condition of things; they must exercise care and diligence in running their road with out regard to the time when the road is opened. The ordinance in question is not one for taxation, nor does it interfere with any vested right. It is in the nature of a police regulation. In establishing such regulations a township committee must exercise judicial discretion and keep within the rules here laid down—what is necessary to public safety.

As a general rule a railroad company is not required to flag every crossing unless extra hazardous. Its liability to do this may be increased by statute and to the extent of this ordinance.

THE SCRAP HEAP.

Railroad Equipment Notes.

The Michigan Car Co., at Detroit, is building 250 Zimmerman refrigerator cars for the Erie & Pacific Dispatch, and 250 box cars extra size for the Michigan Lumber Transportation Co.

The Danforth Locomotive Works, at Paterson, N. J., have orders for 25 locomotives now on hand.

Bowers, Dure & Co., of Wilmington, Del., have just concluded a contract with Baily & Co., circus proprietors, for the building of 100 cars for the transportation of their circus and menagerie. Some of the cars will be very large ones, and four of them are to be show cars. There will also be sleeping and dining cars for the performers.

The shops of the Pullman Palace Car Co., at Detroit, are to build 150 more cars for the Metropolitan Elevated road.

A new ash-pan cleaner, invented by Paul K. Daly, is being tried on the Intercolonial Railway. It can be used to clean out the ash-pan while the engine is in motion, and is said to work very well. It is also in use on the New Brunswick Railway.

The Taylor Iron Works, at High Bridge, N. J., have orders on hand for over 5,000 car-wheels an. 2,500 axles.

The steel works at Pompton, N. J., are to be started up and a manufactory of car springs established there.

The Erie (Pa.) Car Works have a large order for gondola cars from the Buffalo, New York & Philadelphia road.

The Dickson Manufacturing Co., at Scranton, Pa., is building some consolidation freight engines for the Boston, Hoosac Tunnel & Western road.

The Taunton (Mass.) Locomotive Works are building some engines for the Boston, Hoosac Tunnel & Western road.

Iron and Manufacturing Notes.

The East St. Louis Rail Mill was destroyed by fire on the night of Feb. 26, the buildings burned down and the machinery spoiled or badly damaged. The loss is said to be over \$100,000 and is nearly covered by insurance.

W. W. Johns' Asbestos liquid white paint has been adopted for use on all the interior and exterior wood, iron and stone work of the Capitol of the United States at Washington. An immense amount of paint is needed for this purpose.

The Halliday windmill is now in use on the Chicago & Northwestern; Chicago, Rock Island & Pacific; Chicago, Burlington & Quincy; Michigan Central; Burlington, Cedar Rapids & Northern; St. Paul & Sioux City; Central Branch, Union Pacific; Northern Pacific and other roads. The mills have been manufactured for nearly a quarter of a century by the United States Wind Engine & Pump Co., of Batavia, Ill., and some of those first erected are still doing good work. The manufacturers claim that recent improvements have been made in their construction, which greatly increase their value for railroad pumping.

The business of the Seamless Steel Ware & Frog Co., of Harrisburg, Pa., will hereafter be conducted under the name of the Jackson Manufacturing Co., a corporation regularly chartered under the laws of Pennsylvania. The company makes, besides other articles, steel barrows and other railroad supplies, and also manufactures signals for the Toucey & Buchanan Signal Co.

The Chisholm Steel Shovel Co., at Cleveland, O., is running its works day and night to fill orders.

Mr. Taylor, of the Ohio Nut & Bolt Co., has leased the Union Iron Works, at Newburg, O., and will begin to make track bolts there.

The Thomas Iron Co., at Hokendauqua, Pa., is preparing to put another furnace in blast.

The Buckeye Bridge & Boiler Works, at Cleveland, O., are building a large gas-producer for the Otis Iron & Steel Co., and a number of boilers, including two, each 42 in. diameter and 48 ft. long, for the Tuscarawas Coal & Iron Co.

Crerar, Adams & Co., of Chicago, have been appointed Western agents for the Midvale Steel Works, of Philadelphia.

The Brier Hill (O.) Iron Co. has put its blast-furnace at work again.

The New Jersey Steel & Iron Co., at Trenton, N. J., is running its rolling mill on a large contract for iron for the elevated roads in New York.

The wire mills of the Trenton (N. J.) Iron Co. are running full time on orders.

L. B. Ward is running his Russia iron mill, at Niles, O., full time, employing about 150 hands.

Bridge Notes.

The Leighton Bridge & Iron Works, at Rochester, N. Y., has just completed a highway bridge over the Connecticut River, from Springfield, Mass., to Agawam. It is 1,930 ft. long, and cost about \$100,000. The Leighton Works had already a highway bridge, and the Boston & Albany bridge over the Connecticut at Springfield, this one making their third bridge there.

The Wrought Iron Bridge Co., of Canton, O., has offered to start a branch of its works at Toronto, Ont., provided certain inducements are offered.

In addition to their contract for the new Council Bluffs & Omaha road, lately noted, H. S. Hopkins & Co., of St. Louis, are building a combination bridge of 200 ft. span, for the Little Rock & Fort Smith road, and have just completed three spans and masonry for the same road. They are also

putting in the foundations and masonry for the Red River bridge on the St. Louis, Iron Mountain & Southern.

Spikes.

In an eastward-bound freight train over the Erie last week was a car-load of cats. They were shipped, it is said, from the Pacific slope, and were consigned to a party in New York, who is a dealer in skins. The felines, it is supposed, will be slaughtered on reaching their destination, and their skins used for different purposes. Concerts were given all along the route, and at times large audiences were gathered at the stations.—*Patterson (N. J.) Press*.

Some time ago a Pittsburgh paper mentioned a shipment of cats westward over the Canada Southern. Perhaps this is the same lot sent back again. One would suppose it a good deal easier (and quieter) to ship the skin than the live cat.

A tough old tramp was struck by a Boston & Albany engine the other day, near Charlton, Mass. He was rolled over several times on the track and tossed into the ditch before the engineer could stop the train. The old fellow got up, shook himself, and marched off indignantly without deigning to give any reply to the question whether he was hurt.

Tombstone is the lively name of an Arizona mining town, and may yet be recorded on the time-table of the Southern Pacific. If it comes after Fried Liver on the schedule, some dyspeptic persons may look on it as a natural sequence.

"Oil of promotion" is recommended by the Port Jervis (N. Y.) *Gazette* for hurts. It tells of a fireman on the Erie who had hurt his heel and for several days went limping around town, groaning terribly. One day he got notice of his promotion to be an engineer and at once reported for duty, his heel being quite cured.

Train 13 on the Erie came from Jersey City to Goshen Thursday evening of last week without a single lady passenger on board. The conductor stated he had never known it to happen before during his many years of service. A Goshen lady on hearing of it, aptly remarked that it was a decidedly male train.—*Middleton (N. Y.) Press*.

We have seen sparrows build their nests under a railroad bridge and on top of a passenger car, and now they are reported as building in large numbers in the Chicago, Burlington & Quincy boiler shop at Aurora, Ill. They evidently do not object to noise.

Noise from Safety Valves.

A bill now pending before the Committee on Railroads for the suppression of the noise made by the blowing off steam from safety valves is of much interest to the community. The Commissioners and railway managers know that there are instruments which can be applied to the boiler of a locomotive that will prevent the trouble. Great danger attends the present practice of letting off steam by means of the safety valve in common use. Parties have testified that accidents are constantly occurring near depots where engines are thus disposing of surplus steam. It is much to be desired that some proper plan may be adopted by the railways for the suppression of the noise and the hindrance from danger consequent upon the use of the present safety valve.—*Boston Advertiser*, Feb. 27.

Manufacturing a Stock Claim.

A farmer living along the Rochester & State Line Railroad was accused of attempting a novel stroke of business. Having a horse whose days of usefulness were past, he led it on the track and left it to be killed, with a view of collecting damages on the road. The animal had strength enough to crawl off the track and did so, but yielded up the ghost a few feet away. Searching for the remains next day, the farmer found the dead body on the track and left it outside the cattle-guard. The financial plans of the farmer were defeated, and probably the lives of some passengers saved, by the alertness of the engineer of the express which was first to pass along. The train was stopped just short of the dead animal, and the trick was brought to light.—*Utica (N. Y.) Herald*.

Long-Lived Rails.

The engineer says: "Instances crop up now and then which vividly illustrate the wonderful durability of well-made rails—that is to say, rails of which not only was the material admirable, but the mode of manufacture superlatively good. A case in point is supplied by an accident which recently occurred on the Lynn & Wisbeach Branch of the Great Eastern Railway. As the 1:55 up train from Lynn to March was proceeding on its journey, the third and fourth coach from the engine left the rails about 280 yards on the up side of Middle Drove station. Very little injury was done. On examination it was found that a 15-ft. length of rail was broken into no fewer than seven pieces. It was the fracture of the rail that threw the carriages off the line. It may be said that such a case as this affords anything but evidence of good quality in the rails; but what are the facts? We learn from the report of Colonel Hutchinson that in the immediate locality of this accident the line, which is single, is perfectly straight and practically level. The permanent way consisted at the time of the accident of double-headed wrought-iron rails in 15-ft. lengths, which weighed originally 65 lbs. to the yard, and were laid about thirty-three years ago. They have since been turned several times. They were originally fixed in joint chairs, but in 1868 they were fished at the joints. The chairs were of cast-iron, weighing 23 lbs., and the sleepers—some half-round and others rectangular—measured 9 ft. x 9 in. x 5 in., there being five sleepers to each rail length. The line was being relaid with new steel rails at the time of the accident, and the relaying operations had extended nearly to the spot where the accident took place. Since the accident the whole of the rails on this part of the line have been replaced by new steel ones. Is it certain that they will last thirty-three years and bear turning several times? We quite agree—and so do our readers—with Colonel Hutchinson, that the cause of fracture to the rail is not far to seek. It was laid thirty-three years since, and

and the company avails itself of its option to redeem before maturity.

Atlantic & Great Western.—At the meeting of holders of securities in London, England, Feb. 28, about 600 persons were present, and the following resolutions were adopted by a large majority:

"This meeting approves the lease of the company's railroad and property to the Erie Railway on the terms mentioned in the report of the Reconstruction Trustees, dated Feb. 21, 1879, upon all necessary authorities, consents and cooperation being obtained, including the consent of a majority in value of the holders of the first and second mortgage bonds, pursuant to the revised official scheme of arrangement dated July 21, 1875.

"This meeting approves of the limit to the amount of prior-lien bonds authorized by the revised official scheme of arrangement dated July 21, 1875, being increased from \$7,000,000 to \$10,000,000, upon the consent of a majority in value of the holders of the first and second mortgage bonds.

"This meeting approves of the Reconstruction Trustees, under the powers given to them by the contract and agreement for carrying into effect the revised official scheme of the arrangement dated July 21, 1875, and with all other necessary authorities, if any, increasing the amount of first mortgage bonds to be issued by the reconstructed company to such an amount as will enable the said trustees to compromise and settle by means of them only outstanding, unsettled or disputed claims on this company.

"This meeting approves of the reconstruction, and hereby concurs with the trustees in fixing the first day of May next as the last date on which any further bonds or stock of this company will be received by them, so as to share in the benefit of reconstruction by conversion into securities of the new company."

An amendment postponing the consideration of the lease till the reorganization is completed, was rejected.

Baltimore & Ohio.—On Feb. 26 the ice in Wheeling Creek, at Wheeling, W. Va., destroyed the temporary trestle put up in place of the bridge carried away a few weeks ago. This cuts off communication between the main line and the Wheeling, Pittsburgh & Baltimore Division.

In the West Virginia Senate, March 3, a resolution was introduced instructing the Board of Public Works to regulate the rates charged for transportation on this road. This is based on the claim that under the charter granted by the state of Virginia in 1837, whenever the net profits of the road equal the amount of the capital stock of the company, the Board of Public Works shall regulate charges for transportation over the road, so that the profits shall not exceed 6 per cent. on the stock.

Boston & Albany and Boston & Providence Consolidation.—The proposed consolidation of these two companies seems to have fallen through, negotiations having ceased, with no immediate prospect of renewal. It is said that the Boston & Providence directors put a higher valuation on their property than the Boston & Albany was willing to allow; \$7,500,000 is the amount named. The Boston stockholders of the Boston & Providence are said to have been in favor of the consolidation generally. At least they manifested no opposition, but the Providence stockholders were actively and bitterly opposed to it.

Burlington & Missouri River in Nebraska.—The United States Supreme Court has decided in favor of this company a case which involved the right of the United States to annul certain patents issued to the company for 1,200,000 acres of land in Nebraska. The decision in the lower court had been in favor of the company.

Carolina Central.—This company has a bill before the North Carolina Legislature providing for its reorganization under the name of the Wilmington, Charlotte & Western Railroad Company, and for its extension westward to Rutherfordton and through Reedy Patch Gap to the Tennessee line.

Cincinnati Southern.—The earnings of the road under the Common Carrier Company for the year 1878 were as follows:

Total earnings	\$498,820
Expenses (34.58 per cent.)	173,027
Net earnings	\$325,793
Ten per cent. on capital of Common Carrier Co.	\$26,440
Ten per cent. of net surplus to Co.	29,925
	56,375

Balance paid to Trustees \$269,418

The net earnings for January were \$15,215. Near the close of 1878 the company added two engines, 25 flat and 25 coal cars to the equipment in use.

The Trustees report a balance of \$525,371 on hand Jan. 31.

Cleveland, Columbus, Cincinnati & Indianapolis.—Notice is given that 32 consolidated bonds of this company have been drawn for redemption, in accordance with the terms of the mortgage, and will be redeemed at the office of Drexel, Morgan & Co., in New York, or J. S. Morgan & Co., in London, on June 1, at which date interest on the drawn bonds will cease. The numbers drawn are: 3753, 3860, 3875, 3980, 4011, 4334, 4368, 4411, 4496, 4567, 4625, 4665, 4849, 4917, 4942, 5112, 5129, 5130, 5285, 5308, 5350, 5353, 5426, 5473, 5570, 5578, 5645, 5721, 5814, 5892, 5930 and 6202.

Colorado Central.—It is locally reported that the Union Pacific intends to push this road from Georgetown, Col., to Leadville and into the San Juan mining region, being unwilling to leave that field entirely to the Atchison, Topeka & Santa Fe.

Decatur, Mattoon & Southern.—Charles L. Frost, of New York, publishes the following notice: "Take notice, that certain bonds paid over to you in compromise of claims vs. Cleveland Iron Company and other persons connected therewith by Geo. L. Ingersoll, of said company, or agent for them, under the name and style of the Decatur, Mattoon & Southern Railroad Company, and executed by the said Ingersoll as President thereof, are fraudulent and void in law, as well as all others issued by said Ingersoll upon the property of the Decatur, Sullivan & Mattoon Railroad Company of Illinois, for which he was appointed Trustee by me and other owners of said property."

Delaware Railroad Regulation.—The latest proposition submitted is that the state shall buy the Delaware Railroad and its branches, and run them in the interest of the peach-growers, who are the chief producing interest of the state.

Denver, South Park & Pacific.—Trains on this road are now running to Webster, Col., three miles beyond the old terminus at Grant, and 69 miles southwest from Denver.

Duluth, Iowa & Dakota.—This company is organized to build a railroad from some point on the Northern Pacific in Todd County, Minn., southwest by way of Sauk Centre, Swift Falls and Benson to a point on the Dakota line in Lyon County, a distance of about 160 miles. The stock is to

be \$2,000,000, the debt limited to an equal amount. The office is at Benson, Swift County, Minn.

Eastern Shore.—The second-mortgage bondholders, who bought this road at the foreclosure sale, have filed a certificate of incorporation of a new company known as the "Eastern Shore Railroad Company as Readjusted." The capital stock is limited to \$450,000; the road is from Delmar, Md., to Crisfield, 38 miles. The incorporators are Wm. L. Brittingham, H. H. Dashell, George R. Dennis, Wm. H. Gale, Wm. H. Roach, Thomas Sudler, Levin L. Waters and Levin S. Woolford, of Somerset County, Md.; Elihu E. Jackson and E. S. Toadvine, of Wicomico County, Md.; Wm. Tompson, of Delaware: Samuel M. Felton, W. C. Longstreth and W. L. Shaffer, of Pennsylvania.

East Line & Red River.—Track on this road is now laid to Carrollton, Tex., eight miles beyond the late terminus at Winnsboro, and 72½ miles from the eastern terminus at Jefferson. The grading is done to Sulphur Springs, 7½ miles further.

Elmira & Williamsport.—The Pennsylvania Railroad Company, for and on account of the Northern Central Company (lessee of this road), gives notice that it will, on and after March 15, purchase from the holders at par and accrued interest any of the \$1,000,000 mortgage bonds of this company which will become due Jan. 1, 1880. Or, if they so desire, holders may extend their bonds in registered form, without coupons, for a period of 30 years from maturity, at 6 per cent. interest, secured by the same mortgage and the same guarantees. Holders desiring to extend their bonds must notify Stephen W. White, Secretary of the Northern Central Company, at No. 233 South Fourth street, Philadelphia, by May 1, at the same time signing the necessary agreement and depositing their bonds. Holders extending their bonds can have the coupons for July 1, 1879, and Jan. 1, 1880, cashed at the time of depositing the bonds.

Emlenton, Shippensburg & Clarion.—A controlling interest in this road has been bought by parties interested in the Foxburg, St. Petersburg & Clarion Company. The two lines compete for a considerable part of the business of both. The Emlenton road is of 3 ft. gauge and 30 miles long, from Emlenton, Pa., to Clarion.

Fort Madison & Northwestern.—A construction company has been organized to build this road, which is graded for some distance westward from Fort Madison, Ia. The company has bought two engines, some cars, and 600 tons of rails, and will begin work as soon as the weather permits.

Foxburg, St. Petersburg & Clarion.—A committee of stockholders is considering the question of extending this narrow-gauge road from the present terminus at Jefferson City, Pa., northeast to Kane on the Philadelphia & Erie road, a distance of about 50 miles.

Parties interested in this company have bought a controlling interest in the Emlenton, Shippensburg & Clarion, a parallel and competing line.

Gettysburg Branch.—It is proposed to build a railroad about 12 miles long, from Gettysburg, Pa., southeast to Sell's Station, on the Frederick Division of the Pennsylvania Railroad. Enough money has been raised to pay for the preliminary surveys.

Gulf, Colorado & Santa Fe.—The first passenger train over this road was run on the occasion of the Carnival celebration in Galveston, when a special train made the round trip from Richmond to Galveston and return. The older part of the track is now being leveled up and put in good order.

Hannibal & St. Joseph.—Notice is given that 25 of this company's sinking fund land-grant bonds have been drawn for redemption according to the terms of the mortgage, and will be paid on presentation to the Farmers' Loan & Trust Company in New York. Interest will cease from May 1. The numbers drawn are: 27, 93, 119, 142, 203, 211, 240, 267, 273, 307, 309, 336, 348, 354, 378, 403, 428, 442, 463, 489, 536, 551, 586, 587.

Havana, Rantoul & Eastern.—This company is now running regular daily trains over the new extension from Rantoul, Ill., westward to Leroy. The stations on the new line, with the distances from Rantoul, are: Prospect, 3 miles; Tomlinson, 4; Dewey, 7; Fisher, 10; Dickerson, 14; Howard, 16; Mebarry, 19; Laurette, 21; Delana, 24; Sabina, 27; Crumbaugh, 29; Leroy, 34. The road is now 76 miles long, from West Lebanon, Ind., to Leroy, Ill.

Indiana North & South.—In the suit of the Union Trust Company against this company a decree of foreclosure was last week granted by the United States Circuit Court, with an order directing the sale of the road, in default of full payment of all arrears by March 6. The amount of funded debt and unpaid interest is \$825,000; the road is 15 miles long, from Attica, Ind., to Veedersburg.

Indianapolis, Bloomington & Western.—The Western Extension bondholders joining in the purchase of that part of the road are asked to subscribe for new preferred bonds to the extent of \$35 for each \$1,000 old bond. The proceeds of the new bonds are to pay off outstanding debts and liens and buy equipment.

James River & Kanawha Canal.—The bill to authorize this company to sell its property to the Richmond & Allegheny Railroad Company has finally passed the Virginia Legislature.

Another bill has been introduced which provides that, in case the railroad company does not comply with the terms of the bill within 120 days, the canal company shall have authority to sell the property to any other corporation which will meet the conditions required.

Lincoln & Catawba.—This company asks the North Carolina Legislature for a charter to build a branch or extension of the Carolina Central road from Lincolnton, N. C., north by west about 25 miles to Hickory on the Western North Carolina.

Manitoba Railroad Projects.—An Ottawa (Can.) dispatch says: "Several prominent gentlemen from Manitoba are at present in the city for the purpose of watching the progress through the House of several charters for the construction of a number of colonization railways in the province of Manitoba and the Northwest Territory. The latest information in relation to the matter is that the different projects are likely to be harmonized into one scheme, or the whole of the bills withdrawn in favor of a charter being granted for a company to construct a railroad westward from Winnipeg, north of the River Assiniboine, and southward of Lake Manitoba, and a second line running at the outset south from the city of Winnipeg, and then trending in a southwesterly direction, tapping the Menonite settlement. These lines will constitute feeders for the main line of the Pacific Railway, when it shall be built. Another portion of the scheme, depending first upon the construction of the whole of the Thunder Bay Branch, is to build a road on the west side of Winnipeg River, connecting Winnipeg and Selkirk. It is understood that the companies interested, claiming that the roads are for colonization purposes, will ask for land subsidies, and as lands available for this purpose are

not to be found in Manitoba to any extent, the Northwest territories must be drawn on."

Mankato & St. Cloud.—This company has filed articles of incorporation to build a railroad from Mankato, Minn., due north to St. Cloud, about 100 miles. The capital stock is to be \$2,000,000, and the debt is limited to \$2,000,000. The office is at Mankato, Minn.

Minneapolis & St. Louis.—The Minnetonka Branch, which this company purposed building, will be about five miles long—from Eden Prairie, 10 miles from Minneapolis, to Lake Minnetonka. At that place an effort is being made to build up a large summer resort.

New York, Housatonic & Northern.—The bondholders of this company have applied to the Connecticut Legislature for an act to incorporate them as successors to the company. They own only 5½ miles of road, from Brookfield Junction, Conn., to Danbury, which is leased to the Housatonic Company.

New York, Lake Erie & Western.—This company will receive at the office of the Division Superintendent in Buffalo, N. Y., until March 17, proposals for building a new depot in Buffalo, consisting of a brick station-house and three wooden sheds adjoining. Also for machine shop at East Buffalo, consisting of a locomotive engine-house, a machine shop, a boiler and blacksmith shop, a store-house, and a stationary engine-house, of brick, with iron roofs. Plans and specifications can be seen at the office. The engine-house is to hold 52 locomotives.

The new depot, designed by J. Crawford Neilson, architect, of New York will have a frontage of 110 feet on Michigan street, and 52 feet on Exchange street and 350 feet of covered platforms parallel with the last-mentioned thoroughfare. The main structure will be built of brick with stone columns and stone trimmings. It will be three stories high, including a Mansard roof. The first floor will be occupied for waiting-rooms, baggage-rooms, ticket-offices, etc.; the second for the company's offices, and the third for the library, reading-rooms, etc., of the Erie Railways Temperance Association.

New York & New England.—Sealed proposals will be received at the office of W. Howard White, Chief Engineer, No. 244 Federal street, Boston, until March 31, for the completion of 40 miles of this road, from Waterbury, Conn., to Brewster's, N. Y. The road was graded in part several years ago by the Hartford, Providence & Fishkill Company. The completion of this section to Brewster's will give the road a connection with the New York & Harlem, and complete a line which may be used as an all-rail line between Boston and New York. It will be 242 miles long, only eight miles longer than that by Springfield and New Haven.

Northern Central.—At the annual meeting in Baltimore, Feb. 27, a resolution was offered providing for the appointment of a committee to investigate the affairs of the company, with power to employ counsel and skilled accountants. After a long and somewhat pointed debate, this was voted down.

A resolution that no officer or agent of any other company be chosen a director was not received, the Chair ruling it out of order and a majority sustaining the decision.

The supplemental lease of the Shamokin Valley & Pottsville Railroad Company to the Northern Central Company of the additional lands acquired by the former company since the execution of the original lease was approved by the stockholders.

Pittsburgh Southern.—The proposed line of this road, from Grafton, W. Va., southward, is by the Tygart River to Beverley in Randolph County, thence by Elk or Mingo Creek to Elk Mountain, where a tunnel 1,500 feet long will be needed to reach the valley of the Greenbrier River. Two routes are then proposed, one by Beaver Lick Mountain, the other by Spring Mountain and Lewisburg, both leading to Union in Monroe County, whence there is an easy route by Rich Valley to the New River, at the mouth of Wolf Creek, where connection will be made with the projected New River road. The line passes over many valuable deposits of iron ore and coal.

Rochester & State Line.—It is reported that the New York Central & Hudson River Company, which controls this road, will soon take the direct management, and operate it either under lease, or simply by putting its own officers in charge. The trains will then be run to the Central depot in Rochester.

Rutland.—A Boston dispatch of March 1 says: "The board of directors has arrived at an agreement with the committee appointed by the equipment bondholders in regard to exchange of their bonds for bonds of the new issue, and, as suggested by the bondholders, has appointed O. W. Peabody to act as its representative on the Finance Committee. The reduction of the rate of interest from 8 to 6 per cent. on the first-mortgage bonds, as agreed upon at the bondholders' meeting, appears to have a good effect on the market price of the bonds, as well as on the credit of the company. The funding of coupons and reduction of rates of interest, as proposed and approved by the votes of the bondholders, will enable the company soon to retire the remainder of the floating debt, leaving, when all the bonds authorized are issued at the rates proposed, a total annual charge for interest of \$165,000."

Shelby.—This company is engaged in an active war with the Louisville, Cincinnati & Lexington Company, to which its road was at one time leased, and whose line is its outlet to Louisville. The Louisville Company has broken the connection between the two roads at Anchorage, Ky., and the Shelby Company has applied to the courts to compel a renewal of the connection. The Shelby Company also threatens to extend its line some six miles to a connection with the Louisville, Harrod's Creek & Westport. The trouble grows out of a contest for the control of the Cumberland & Ohio, Northern Division.

Southeastern, of Canada.—In explanation of the recent purchase of securities of this company by Mr. Bradley Barlow, the St. Albans (Vt.) Messenger says: "After the death of the late Hon. A. B. Foster, Mr. Barlow took an interest in that railway in order to help his son-in-law, Mr. C. W. Foster, and the other heirs of that estate, to protect their interests and realize as much as possible from their investment in the road. He made a proposition to the English security-holders, which, if the foregoing is true, they have accepted, and it is probable that for himself and others in trust, he has accepted the ownership. Mr. Barlow is now in Washington, and no one here seems authorized to speak for him."

Southern Pacific.—This company has agreed to build a branch from Colton, Cal., to Riverside, 10 miles, if the parties interested will grade the road-bed.

The Pullman Sleeping-Car Investigation.—The subcommittee appointed to investigate the reasonableness of sleeping-car charges to the Illinois Legislature says of its examination of the Pullman Company:

"Your committee procured the annual statement for the last fiscal year, showing the revenues and disbursements and

the assets and liabilities of said company; also a statement showing the amount invested in Illinois, and the earnings and expenses, which are hereto attached. The report gives as the result of the investigation, that the number of passengers carried per car in Illinois is twelve. The average receipts per passenger, \$1.76; average cost per passenger, \$1.31; net receipts per passenger, 45 cents. The net return upon these lines has been 7.9 per cent per annum, after allowing 5 per cent for depreciation. The Company has for some years paid 8 per cent, dividends. The salaries paid the principal officers are not beyond the reasonable value of the services rendered, while for the under officers and employés the salaries are low. A surplus fund of nearly \$3,500,000 has accumulated and been laid aside during the last eight years and kept as a fund to cover depreciation of property. This amount of surplus is not however, in bonds or cash, but has been invested in new cars and in canceling maturing liabilities. The net earnings for the past year show a falling off as compared with five years ago." In conclusion the report says: "This sub-committee is of the opinion that the accommodation furnished by said company is one of the necessities of this age; that its affairs are economically and systematically managed, and that its gross receipts in this state and in all the states and territories and in Europe, when the expense incurred and when the amount of capital invested are considered, the rates are not unreasonable or exorbitant."

Tide Water Pipe Line.—This company has already got into difficulties with the railroads, the Northern Central having forcibly prevented the laying of the pipes under its road near Williamsport, Pa. The matter will be settled in the courts.

Union Pacific.—The change in the directory at the annual meeting this week was much less sweeping than common rumor has indicated. Only three new directors were chosen, all members of the New York Syndicate lately reported as buying largely of the stock. Jay Gould voted on 123,700 shares in his own right and 20,000 by proxy.

Warren & Bradford.—This company purposed building a narrow-gauge road from Bradford, Pa., to Warren, about 30 miles, forming an extension of the Olean, Bradford & Warren road. Negotiations are now in progress for the laying of a third rail on the Dunkirk, Allegheny Valley & Pittsburgh road from Warren to Titusville, so that narrow-gauge cars can be run through from Bradford to Titusville, if the road is built.

Waukon & Mississippi.—It is stated that this branch of the Chicago, Clinton, Dubuque & Minnesota is to be extended westward from Waukon, Ia., this year. The route and length of the extension depend somewhat upon the subscriptions offered.

Western Counties.—Mr. E. W. Plunkett, contractor for this Nova Scotia road, has, it is stated, failed in his endeavor to raise money for the completion of the road by the sale of the bonds in England.

Worcester & Nashua.—The board of directors has voted to adopt the plan presented by a committee lately appointed to consider the financial condition of the company. It provides that the rental of the Nashua & Rochester road shall be reduced by paying only 3, instead of 6 per cent, on the stock, and that bondholders of both the Worcester & Nashua and the Nashua & Rochester road be asked to reduce the interest to 5 per cent.

ANNUAL REPORTS.

Chicago, Burlington & Quincy.

Of the 25th annual report of this company, covering the calendar year 1878, only the report of President J. M. Forbes has yet appeared, and from it we take the figures and statements below. The detailed reports of the other officers will appear later.

The statement of mileage given is as follows:

	Miles.
Miles owned and leased Jan. 1, including all branches, and also the St. Louis, Rock Island & Chicago R. R.	1,547,907
Added during the year, Ia.	20,800
Hastings to Sidney, opened Dec. 2	20,800
Creston to Fontanelle, opened Nov. 17 (5½ miles more to be built)	20,500
Chariton to Indiana, opened Dec. 33 (16 miles more to be built)	16,900
Total	58,200
Add for roads leased and worked jointly with other companies and roads for which a fixed yearly rental is paid	1,606,107
Total miles, Dec. 31, 1878	1,700,674

The stock and debt at the close of the two last years were:

	1878.	1877.	Increase.
Stock	\$27,056,816.51	\$27,644,916.51	\$311,900.00
Bonds	30,877,725.00	30,604,825.00	272,900.00
Total	\$58,933,541.51	\$58,240,741.51	\$584,800.00

Changes in the bonded debt were as follows:			
Seven per cent. bonds issued in exchange for other bonds	\$178,000		
For branch bonds	713,000		
To pay for construction	656,000		
Total	\$1,547,000		
Old bonds retired by exchange	\$178,000		
Old 8 per cent. bonds taken by sinking fund	4,000		
Branch bonds exchanged	663,000		
Under 4 and 5 per cent. sinking funds	115,000		
B. & M. R. bonds paid or converted into stock	314,100		
Total	1,274,100		

	1878.	1877.	Inc. or Dec.	P. c.
Freight	\$11,152,178.68	\$9,534,543.65	I. \$1,617,635.03	17.0
Passengers	2,439,180.46	2,483,400.43	I. 44,219.07	1.8
Mail, express, etc.	522,143.02	512,931.42	I. 9,212.50	1.8
Interest and exchange	6,162.40		I. 6,162.40	
Total	\$14,119,065.46	\$12,530,875.50	I. \$1,388,789.96	12.7

	1878.	1877.	Inc. or Dec.	P. c.
Expenses and taxes	7,871,915.15	7,309,708.81	I. 562,206.34	7.7
Net earnings	\$6,247,750.31	\$5,221,166.09	I. \$1,026,583.62	10.7
Gross earn. per mile	8,596.37	7,733.20	I. 793.17	10.2
Net earn. per mile	3,772.80	3,222.15	I. 550.65	17.1
Percent. of exps	55.75	58.33	D. 2.58	4.4

The disposition of net earnings was as follows:

Net earnings	\$6,247,750.31
Rents of tracks and depots	\$155,604.89
Interest	2,155,971.81
Sinking fund	233,313.27
Judgment fund (tax on capital stock), renewal funds and dividends	3,477,483.88
Net surplus for the year	\$235,286.46

The report says: "The number of tons carried increased 22.8 per cent, and the receipts from freight increased only 16.9 per cent. These figures indicate that the volume of business has increased faster than the earnings. The increase of freight cars has been 22.32 per cent.—just keeping pace with the increase of business. The payments for rent of cars in 1878 amounted to \$118,738.08 as compared with \$150,833.96 paid in 1877. This shows a diminution of \$32,100.98, but indicates that the wants of the company in the way of freight cars are still considerably in advance of the present supply. * * *

When considering the question of reorganizing our financial policy some time ago, the attention of your board was forcibly drawn to the low estimate then put upon some of our bonds in the market as compared with other first-class securities.

Upon careful examination of the subject, it was believed that this discrimination against us was chiefly owing to the want of an adequate sinking fund, and to a belief which had gained ground (to a certain extent unjustly) that our debt bore an undue proportion to our margin of capital.

In a less degree, the too high rates of our interest also operate unfavorably, as tending to keep our securities out of the portfolios of trustees and other conservative investors who naturally prefer securities bearing no premium, and producing an income which can be conveniently divided semi-annually without trenching upon the principal of the invested funds.

In view of these and other considerations, when providing means for the needful outlays of the year and of the near future, we decided to try the experiment of suspending the sale of our consolidated sevens, which had been provided for purposes of construction, and also for meeting certain maturing bonds, and in lieu thereof to raise the needful money in other ways, as will be seen by the circular of Dec. 14, 1878.

These were, in substance, to issue to our stockholders new stock at par, and to appropriate temporarily, or otherwise, as may hereafter be determined, a portion of the profits of the year, which, under the stimulus of good crops, a rapidly growing country and other causes has been, perhaps, exceptionally prosperous.

They have accordingly carried to a renewal fund, out of the ordinary net earnings, the sum of \$1,000,000, and have offered to the stockholders \$2,782,361 of stock at par.

Anticipating the result of this policy, the following figures may be interesting:

Amount of funded debt outstanding Dec. 31, 1878—

C. B. & Q. bonds of various issues	\$21,510,475.00
B. & M. R. bonds of various issues	4,548,250.00
Sundry branch bonds (for which C. B. & Q. is contingently liable)	3,810,000.00
Total	\$30,877,725.00

From this may be deducted the following:

Cost of investment for C. B. & Q. sinking fund, in other than C. B. & Q. 8 per cent. bonds (fully worth their cost)	\$1,067,889.35
Amount of the B. & M. land-grant bonds as being fully provided for by proceeds of lands already sold and in process of sale	4,638,250.00
Amount of branch bonds due April 1, 1879, provided for (as per printed circular) in new issue of stock to be made in January, 1879	583,000.00
Total	\$6,280,139.35

Leaving what is practically the net funded debt

But part of this funded debt may be absorbed by conversions into stock, say \$910,000 of convertible B. & M. 8 per cent. bonds	\$1,067,889.35
Amount of capital stock (C. B. & Q. and B. & M.) outstanding Dec. 31, 1878	\$27,950,816.51
New stock to be issued in January, 1879	2,782,261.00
Total stock and funded debt, net, after new stock is issued	\$30,730,077.51

Net earnings

General freights	\$2,305,801	\$2,638,698	D. \$242,807	9.2
Miscellaneous freights	104,064	77,038	I. 27,029	35.1
First-class passengers	344,765	371,153	D. 26,388	7.1
Emigrant passengers	1,023	1,409	I. 514	3.7
Express	36,505	36,695	D. 130	0.4
United States mails	27,200	30,205	D. 3,005	0.9
Misc. passengers	10,653	17,795	D. 7,142	40.1
Total	\$2,921,061	\$3,172,003	D. \$251,932	7.0
Expenses	2,044,049	2,049,628	D. 4,670	0.2

Net earnings	\$876,112	\$1,123,365	D. \$247,253	22.0
Gross earn. per mile	10,143	11,017	D. 874	7.0
Net	4,042	3,901	D. 859	22.0
Per cent. of exps	70.66	64.60	I. 5.40	8.4

A summary of the general income accounts is as follows:

Net earnings Pennsylvania R. R. Division	\$9,390,030.60
Interest from investments (cash)	1,804,845.63
Interest on equipment from branch roads	277,916.63
Royalty on coal, Mineral R. R.	

Brought forward.....	\$5,187,680.35
Northern Central, one-half loss on leased lines.....	\$147,873.09
Penna. Canal Co., advances to pay interest.....	30,154.63
Shamokin Coal Co., advances to pay interest.....	7,545.04
Balt. & Potomac advances to pay interest.....	154,138.07
Am. Steamship Co., advances to pay interest.....	55,000.00
All. Valley Co., advances to pay interest.....	240,260.07
Phila. & Erie, advances to pay interest.....	231,654.27
	866,626.07
Balance.....	\$4,321,063.28
Dividend, 2 per cent.....	1,377,404.00
Balance to profit and loss.....	\$2,943,659.28

The net earnings of the Philadelphia & Erie, after deducting \$191,604.52 interest on equipment, were \$684,507.14, which was paid to the company as rental. A further net advance of \$231,654.27 was required to meet interest.

The net loss on the New Jersey lines was less than in 1877 by \$345,742.88, or 23.3 per cent.

There was no charge to income for the lines west of Pittsburgh, they having met all liabilities. The sum of \$285,250 was advanced to pay Grand Rapids & Indiana interest, but the charges held as an asset are considered good, and no charge is made to income.

The profit and loss account is as follows:

Net balance from income, as above.....	\$2,943,659.28
Balance to credit, Dec. 31, 1877.....	2,347,382.00
Amount realized from old accounts.....	77,696.91
	35,368,738.19
Totals.....	35,368,738.19
Reduction in value of securities.....	\$645,675.00
Accounts charged off as of no value.....	362,861.27
Securities transferred to suspense account as of doubtful value.....	302,386.78
	1,310,923.05
Balance at credit, Dec. 31, 1878.....	\$4,057,815.14

The charges to construction account during the year were as follows:

Construction, Penna. R. R.	\$202,204.98
" United N. J.	99,078.77
New equipment.....	42,727.27
Real estate, Penna. R. R.	111,307.94
" United N. J.	55,148.44
Branch and connecting roads.....	35,043.91
Total.....	5546,171.31
Less real estate sold, Penna. R. R.	\$32,329.67
Less real estate and old equipment sold, United N. J.	138,121.50
Less amount charged branch lines.....	35,043.91
	206,095.08

Net increase in construction account..... \$340,076.23

The principal items of expenditure for construction upon the Main Line were the completion of the important iron bridge over the Monongahela River near Turtle Creek, the advantages of and necessity for which were explained in the last annual report, and the purchase of additional right of way required for the improvement of the Philadelphia Division.

The expenditures on the New Jersey Division embraced \$60,000 of the amount required to replace the old wooden bridge over the Raritan River, at New Brunswick, with a double track iron and stone bridge 1,619 feet in length. The balance expended thereon in 1878 (\$73,066.17) was charged to expenses. The remainder of the charge to construction represents the cost of additional right of way.

The amount charged to real estate was mainly in payment for additional ground for depot facilities at various points upon your lines, and in the purchase of the two properties immediately adjacent to your general office in Philadelphia, to provide accommodations for the Empire and Union Line organizations. The cost of the alterations necessary to adapt them to this use was charged to expenses.

The amount charged to real estate on the New Jersey lines was almost exclusively in satisfaction of mortgages existing on property heretofore purchased by the United Companies.

The outlay upon branch roads represents mainly an increase of facilities upon the Lewisburg, Centre & Spruce Creek road, and the purchase of additional right of way, and construction of sidings upon other lateral lines.

The amount required for construction purposes in 1879 will be greater than in 1878, as it is proposed to increase the terminal facilities at Jersey City by altering and extending the present piers and constructing a new pier and grain elevator on the Harshim's Cove property. The outlay for this has been postponed from time to time, but the period now seems to have arrived when your interests require this expenditure, not only to place your lines on an equality with competitors, but to secure facilities for a more prompt and economical handling of freights at that important point, and thus obtain increased earnings from your equipment. It is believed that in this way the capacity of your railways can be increased to a greater extent than by an investment of the same amount in additional equipment, or in any other form.

It is also proposed to construct a pier and dock, with the necessary side tracks, on the old Navy-Yard property at Philadelphia. This will enable the company to dispense with the use of the private wharves and property now rented immediately adjacent thereto, and thus save a large annual rental paid thereto.

The improvement of the Philadelphia Division will also be continued at a point known as Valley Creek, where the present abrupt curvature of the line, and the character of the large bridge, interfere with a proper economy in the movement of the traffic.

The debt due the state of Pennsylvania on account of the purchase of the Main Line was reduced in 1878 by the payment of \$234,286.98, which was charged to capital account. The remainder of \$460,000 annual payment to the state being \$225,713.07, and representing interest, was charged, as above stated, directly to income account for the year.

At the close of 1877, the bills payable of the company amounted to \$1,500,000, and of the Pennsylvania Company, to \$2,933,699.99, an aggregate of \$4,433,699.99. The floating debt of the latter company, as hereinafter stated, has been entirely paid off, and that of the Pennsylvania Railroad Company reduced to \$950,000—making a total reduction during the year of \$3,483,699.99.

In pursuance of the provisions of the consolidated mortgage of the company, the sum of \$100,000 was set apart and appropriated on the 1st day of July last, out of the net income, to the purchase of outstanding bonds secured by that mortgage and entitled to the security of the covenants therein in relation to a sinking fund. Bonds of the par value of \$105,000 were thus purchased, and after being canceled, were delivered to the Trustees under the stipulations of said mortgage. This reduction appears in the Treasurer's general account.

During the past year the United New Jersey Railroad

& Canal Company delivered to your company \$841,000 of 6 per cent bonds to provide for \$450,000 of the bonds of the New Jersey Railroad & Transportation Company, maturing Aug. 1, 1878, and to reimburse your company for the payment of \$391,000 of the bonds of the Camden & Amboy Railroad & Transportation Company that had matured. The bonds for \$841,000 were sold, and the premium received thereon credited to the income from securities owned by the United New Jersey Railroad & Canal Company for the year 1878.

The amount of bonds at their par value in the sinking fund for the redemption of the classes of bonds issued by the several companies forming the United New Jersey Railroad & Canal Company is \$1,183,300. This investment is an asset of your company, and will, in the future, be represented by an issue of bonds under the general mortgage of that company, in accordance with the terms of the lease.

Under the several car trusts, referred to in the last report, including those connected with the purchase of the Empire Line, there has been placed upon your lines east of Pittsburgh 3,500 eight-wheeled coal cars, 3,406 box and other freight cars and 1,308 oil-tank cars, and upon the Pittsburgh, Cincinnati & St. Louis Railway, 1,000 box cars—in all, 9,214 cars.

The cost of these cars was \$7,034,000, of which \$535,000 was for the lines west of Pittsburgh. The certificates paid and canceled, in addition to interest paid, are thus far \$1,173,000, leaving \$8,860,000 outstanding.

Results have fully justified the purchase of the Empire Line.

The general statement for all the lines east of Pittsburgh and Erie is as follows:

	1878.	1877.	Inc. or Dec. P. c.
Gross earnings.....	\$31,630,735	\$31,117,146	I. \$519,589 1.7
Expenses.....	18,468,004	19,028,467	D. 530,473 2.9
Net earnings.....	\$13,167,741	\$12,088,679	I. \$1,079,062 8.9
Rentals and interest on equipment.....	1,084,190	1,004,261	D. 220,071 11.6
Net balance.....	\$11,483,551	\$10,184,418	I. \$1,309,133 12.8

The percentage of expenses to gross earnings on the various lines was as follows:

	1878.	1877.	Inc. or Dec. P. c.
Pennsylvania R. R., main line only.....	52.91	55.47	58.70
Pennsylvania R. R., including branches.....	53.75	56.63	59.00
United N. J., excluding canal.....	65.50	66.50	58.30
United N. J., including canal.....	66.40	71.30	56.00
Delaware & Raritan Canal.....	55.50	53.30	59.40
Philadelphia & Erie.....	70.00	64.00	65.27

The traffic of these lines was as follows:

	1878.	1877.	Inc. or Dec. P. c.
Passengers carried:			
Main Line and branches.....	5,205,737	5,120,931	I. 75,806 1.5
United New Jersey.....	7,127,224	7,384,725	D. 257,501 3.7
Phila. & Erie.....	450,344	403,176	D. 33,832 6.9
Total.....	12,792,305	13,007,832	D. 215,527 1.7
Passenger mileage:			
Main Line and branches.....	142,036,100	143,153,521	D. 1,117,415 0.8
United New Jersey.....	139,245,413	143,132,968	D. 3,887,555 2.7
Phila. & Erie.....	11,444,005	12,466,241	D. 1,022,236 8.2
Total.....	292,725,524	298,752,730	D. 6,027,206 2.0
Tonage freight carried:			
Main Line and branches.....	10,946,752	9,738,295	I. 1,208,457 12.4
United New Jersey.....	3,840,229	3,962,523	D. 122,294 3.1
Phila. & Erie.....	2,810,460	2,681,450	I. 129,016 4.8
Del. & Raritan Canal.....	1,524,530	2,023,442	D. 498,913 24.7
Total.....	19,121,377	18,405,711	I. 716,266 3.9
Tonnage mileage:			
Main Line and branches.....	1,732,003,131	1,494,708,198	I. 237,204,033 15.9
United New Jersey.....	255,027,095	256,134,099	D. 1,007,004 0.4
Phila. & Erie.....	381,300,202	335,727,141	I. 45,573,061 13.6
Del. & Raritan Canal.....	63,477,228	63,800,450	D. 30,323,222 32.3
Total.....	2,431,807,656	2,180,459,888	I. 251,347,768 11.5

Of the tonnage of the Pennsylvania Railroad and its branches, 5,007,811 tons were coal, an increase of a little over 1 per cent. The average rates on this traffic were, in cents, as follows:

Penna. R. R.	United N. J.	Phila. & Erie.	Total					
Passenger 1,055 miles.	373 miles.	288 miles.	1,718 miles.					
mile.....								
1878. 1877. 1878. 1877. 1878. 1877.								
Receipt.....	2,357	2,303	2,225	3,029	2,980	2,308	2,323	
Cost.....	1,703	1,751	1,521	1,670	3,048	3,444	1,712	1,734
Net.....	0.564	0.612	0.680	0.555	0.019	0.455	0.597	0.589
Ton mile.....	0.918	0.980	1.436	1.510	0.628	0.786	0.939	1.013
Cost.....	0.483	0.532	1.052	1.159	0.445	0.483	0.535	0.615
Net.....	0.435	0.428	0.384	0.351	0.183	0.303	0.394	0.398

* * * *

In connection with the passenger business, it may be stated that during 1878 there were handled 972,008 pieces of baggage, as against 892,420 in 1877, and that but one piece was actually lost during the year. The entire payment for baggage destroyed or unaccounted for were \$603.27.

Of the 10,946,752 tons of freight moved upon the Main Line, 1,738,543 were through, and 9,208,209 local; the volume of east-bound tonnage was more than double that of west-bound; there was also a marked improvement in local freight. Although the bituminous coal traffic shows a small reduction as compared with 1877, yet in east-bound coke there was an increase of 60,064 tons, and in oil shipments an increase of 865,687 barrels.

The maintenance of way expenses have been materially decreased during the year, notwithstanding the road-bed and track between Pittsburgh and New York continue to show a marked improvement.

There were used in renewals on the Main Line and branches 5,019 tons of steel rail and 375,859 cross-ties, and extensive repairs were made to bridges.

The half round-house for the use of passenger engines at Thirty-third street, in the city of Pittsburgh, were completed, the building of which was rendered necessary by the destruction of the shops and engine-houses at this point in the riots of 1877.

There were rebuilt in the shops of the company 10 engines, 1 passenger car, 6 postal cars, 716 box cars and 342 gondola cars.

On the New Jersey Division there was a decrease in expenses in all departments of the service, due to the improvement effected in the condition of the road-bed and equipment. There were used thereon 2,140 tons of steel rail and 163,806 cross-ties.

In through freight upon that division, both east and west, there was a large increase, but in local freight a decrease.

On the Philadelphia & Erie Division the road-bed and

equipment were fully maintained throughout the year, and there were used in renewals 6,213 tons of steel rail and 134,900 cross-ties.

There was a large increase in through east-bound, but a falling off in west-bound freights; in local freight, an increase; in west-bound, a decrease.

It is very gratifying to note an increase of 18% per cent. in the average loads of engines, and an increase in their mileage—two items that materially affect the cost of transportation.

It will be observed that the general account of the Treasurer, and also the General

\$3,200,000 of the six per cent. bonds of the Pennsylvania Company, secured by the pledge of \$4,000,000 of the special guaranteed stock of the Pittsburgh, Fort Wayne & Chicago Railway Company.

"Under the operation of the sinking fund for the redemption of these bonds, which was described in the last annual report, \$113,000 were purchased and canceled prior to Dec. 31, 1878.

"The sum of \$214,200 was paid into sinking funds during 1878 for the redemption of existing mortgages on the leased lines west of Pittsburgh. Of this amount \$104,100 were paid into the fund provided for the extinguishment of the first and second-mortgage bonds, of the Pittsburgh, Fort Wayne & Chicago Railway Company. The aggregate amount of these bonds already redeemed is \$2,239,500, and the annual payments referred to will ultimately extinguish the residue amounting to \$8,170,500, and as no new bonds are issued in lieu thereof, the result, upon their ultimate payment, will be a large reduction the fixed rental of this property.

"During the year \$1,986,000 of the coupon bonds of the Pittsburgh, Cincinnati & St. Louis Railway Company have been converted into registered bonds, in accordance with the authority conferred by act of Assembly and the notice given by the Trustees. This privilege seems to have met the needs of permanent investors, who are availing themselves of it. The holders of the 7 per cent coupon bonds of the Steubenville & Indiana Railroad Company, known as Newark Division bonds, are also availing themselves of the privilege to exchange them for the consolidated mortgage coupon bonds.

"The amount expended for betterment purposes during the year on all the above lines was \$810,759.84, the principal item of which was the cost of 1,500 new freight cars built for the Pittsburgh, Fort Wayne & Chicago Railway, at a cost of \$660,000; the remaining items were for new sidings, station-houses and other improvements on your leased lines.

"The Pennsylvania Company received on account thereof and of expenditures formerly made, \$962,242.29, leaving a balance still due that company of \$186,189.44.

"During the past year the policy of improving and advancing the efficiency of your Western lines was continued, the good effect of which is directly reflected in the net earnings obtained upon the low rates now prevailing. All of the main line of the Pittsburgh, Cincinnati & St. Louis Railway is now laid with steel, and there remain but 61 miles of iron in the main track of the Pittsburgh, Fort Wayne & Chicago Railway, and 17 miles of iron in the main line of the Cleveland & Pittsburgh Railroad. During the year there was laid 29,188 tons of steel and 12,135 tons of iron rail in the renewal of all the lines west of Pittsburgh in which your company is interested by ownership, lease or other control. During the month of September the lines west of Pittsburgh were subjected to exceptionally severe storms, which caused considerable damage and materially increased the cost of repairs.

"The aggregate amount of steel rail laid on the lines owned, controlled or operated by the company east and west of Pittsburgh in 1878 was 45,572 tons."

The Northwestern Ohio Company has bought the interest of the city of Toledo, completing and consolidating the Pennsylvania Company's branch to Toledo.

The residue of the old Mansfield, Cold Water & Lake Michigan Railroad has been transferred to two corporations—one in Michigan, covering the road from Monteith to the Ohio state line, under the name of the Allegan & Southeastern Railroad Company, and the other, in Ohio, covering the road-bed, right of way, etc., from Tiffin to the Michigan state line, under the name of the Tiffin & Northwestern Railroad Company.

Reference is made to the unfinished litigation over the Columbus, Chicago & Indiana Central, and to that over the guarantees of the St. Louis, Alton & Terre Haute line.

The summary for all lines, east and west of Pittsburgh, is as follows:

	1878.	1877.
Passenger mileage	540,000,000	543,977,070
Tonnage mileage	4,245,907,808	3,640,222,819
Gross earnings	\$55,426,062.03	\$54,159,720.33
Expenses	33,611,034.00	34,022,329.40
Net earnings	\$21,815,928.84	\$20,137,390.93

GENERAL REMARKS.

"In accordance with a resolution adopted by a stock vote of the shareholders on the 26th day of March last, your board have created a trust, having for its object the purchase from time to time of the bonds and shares of other companies which are guaranteed by the Pennsylvania Railroad Company. The details of the trust are fully set forth in the printed copy attached to this report. The appropriation for the months of November and December, amounting to \$100,000, has been invested in securities yielding a large annual income upon their cost. The account of the managers has been audited by Israel H. Johnson and William C. Longstreth, the two stockholders selected under the eighth section of the trust, and their certificate of the correctness of the account hereto appended, filed with the Secretary of the company.

"In pursuance of the power conferred by the stockholders, the board at the meeting in November, 1878, passed a resolution rescinding their action in reference to the payment of quarterly dividends, and providing that hereafter dividends should be declared semi-annually, in May and November, as provided in the charter. It was gratifying to your directors to feel assured that the financial condition of the company warranted the resumption of dividends in November last, and they hope that the present economies obtaining in the management of your various properties, and the determination not to assume any further large or extended obligations, with the continuance of friendly relations between the various railroad interests of the country, will furnish a reasonable assurance that dividends can be maintained.

"The arrangement referred to in the last annual report as having been made on the first of July, 1877, between the four trunk-lines, for the division of competitive west-bound freight out of New York, has been continued with beneficial results not only to the railroad interests, but has also been productive of manifest advantage to the general traffic of the country in preventing the rapid fluctuation of rates, which is so injurious to the true interests of trade. This plan has proven so satisfactory in its workings, that there is good reason to expect that the differences from time to time appearing may be harmonized and the arrangement maintained.

"Several meetings have been held by the officers managing the principal western lines, for the purpose of effecting some arrangement, similar in its general features to the one just referred to, in regard to east-bound traffic, with a view to harmonizing conflicting interests at the principal trade centres in the west, and thus affording to shippers uniform, steady and reasonable rates, and securing a fair return upon capital invested. It is confidently hoped that some satisfactory plan will soon be reached for effecting this result.

"The subject of the proper adjustment of rates, both for the protection of the public and the railroad and transpor-

tion interests of the country, is one of such magnitude that it is beginning to claim the serious attention of the general public. It cannot be expected that any subject so vast in its bearings upon general interests can be properly understood without that serious investigation and thought necessary to a proper understanding of a matter so important and intricate. The various legislative remedies so often proposed to correct what are conceived to be public wrongs are generally based on some private grievance, and being framed without proper knowledge, often do violence to the very interests they are intended to protect; it is therefore to be earnestly hoped that the best intelligence of the country may be invoked upon this matter before any hasty conclusion, leading to unwise legislation, is reached.

"Another phase of the same question has presented itself in Pennsylvania, where a suit is now pending against the company and others in connection with the transportation of oil to the seaboard. The position the company has assumed in the management of this traffic was deemed necessary for the protection of its interests against competitive lines and organizations operating under authority of other states. It is hoped that some general agreement or plan may be reached that will properly protect your interest in the transportation of this product, and, at the same time, relieve any individual grievances that may exist.

"The suits brought by shippers of freight against the county of Allegheny to determine its liability for losses caused by the riots which occurred in Pittsburgh in July, 1877, are being pressed to a final decision. Verdicts having been rendered against the county in two test suits tried in Beaver County in May, 1878, writs of error were taken by the county to the Supreme Court, where the cases are now pending. The result of these cases will determine the liability of Allegheny County for the losses incurred by your company.

"The Board have since your last meeting created a Standing Committee on Supplies and a Standing Committee on Insurance, for the purpose of securing a more effective management of your business. The former is charged with the general supervision of the purchase of all material and supplies for the use of the company, and the latter with the

management of insurance against loss or damage by fire to the property of the company or of other corporations managed or controlled by it, and also with the management of the insurance fund."

The insurance fund now has securities and cash valued at \$598,874.

"It is proposed through the Insurance Department to concentrate in one organization the supervision and management of the insurance, not only upon your own line, but upon other lines controlled by the company, under the belief that in this way greater efficiency and economy can be obtained.

"John D. Taylor was elected Treasurer of the Company on the 10th of April, 1878, to fill the vacancy caused by the retirement of Bayard Butler from that position on account of ill health.

"On the 26th of September, 1878, your company sustained a severe loss by the death of George W. Barker, Superintendent of the New York Division. Mr. Barker had rendered long and faithful service in connection with the United Railroads of New Jersey, and by his ability and strict attention to duty, secured the esteem and confidence of all with whom he was associated. To fill the vacancy James McCree was transferred from the superintendency of the Middle Division of the Main Line, on Oct. 15, 1878. S. M. Prevost, who had had much experience in the service of the company, was appointed to fill the vacancy in the Middle Division.

"J. McC. Creighton, formerly Superintendent of the West Pennsylvania Division, was appointed Manager of the Empire Line, to take effect Jan. 1, 1879, in place of Frank J. Firth, resigned. * * *

"The board having tendered to the President, in November last, a leave of absence of rest and recreation, he is now abroad, and his return is expected in the course of a few months.

"The board take this opportunity to express their thanks to the officers and employés for the fidelity and ability with which the duties intrusted to them have been discharged, and to which the economies effected during the past year have been chiefly due."

GENERAL ACCOUNT.

	Liabilities.	—During year 1878—
		Inc. Dec.
To capital stock		\$68,870,200.00
To first-mortgage bonds due 1880		
To general mortgage bonds due 1910		10,069,760.00
To consolidated mortgage bonds due 1905		29,145,000.00
To navy yard mortgage registered bonds due 1881		1,000,000.00
To lien of the state upon the public works between Philadelphia and Pittsburgh, bearing 5 percent. interest, payable in annual installments of \$400,000, applicable first to the interest, and the remainder to principal; the original amount of which was \$7,500,000.		4,337,823.38
To mortgages and ground rents payable		1,294,279.91
		60,746,863.29
Accounts payable, viz.:		
To passenger and freight balances due other roads		\$527,000.51
To pay rolls and vouchers for December, 1878, due in January, 1879		2,214,704.75
To bills payable		930,000.00
To cash dividend due to stockholders unpaid		110,571.50
To dividend scrip of December, 1878, outstanding		2,128.61
To sundry accounts due other roads		1,893,740.50
		5,778,844.93
To appraised value of securities owned by the United New Jersey Railroad & Canal Company and transferred with the lease of the works of that company		3,895,584.60
To equipment of road and canal owned by the United New Jersey Railroad & Canal Company and transferred with the lease of the works of that company		3,789,754.53
To balance to credit of profit and loss		4,057,815.14
		147,130,062.49
Less amount of decrease		
Total amount of increase		
Assets.		—During year 1878—
		Inc. Dec.
By balance standing on the books of the company for the construction of the railroad between Harrisburg and Pittsburgh, including branches to Indiana, Hollidaysburg and Morrison's Cove, also branch to connect with the Pittsburgh, Virginia & Charleston Railroad; also bridge over the Susquehanna River at Columbia, and branch from Columbia to York, in all 349 52-100 miles, and cost of stations, warehouses and shops, on the whole road from Philadelphia to Pittsburgh.		\$24,563,090.08
By balance standing on the books of the company for the purchase of Philadelphia & Columbia Railroad.		5,375,733.43
By balance to debit of equipment of road, consisting of 887 locomotives, 517 passenger cars, 172 baggage, mail and express cars, 16,121 freight cars and 1,558 road cars, including shop machinery, and also including equipment of canal, consisting of schooners, barges and tugs		17,513,296.99
By cost of real estate of the company and telegraph line		9,264,800.66
By extension of the Pennsylvania Railroad to the Delaware River, including wharves and grain elevator		2,070,008.15
Total amount charged to construction, equipment and real estate accounts for the railroads between Philadelphia and Pittsburgh, comprising 1,084 55-100 miles of single track (excluding of Harrisburg & Lancaster Railroad, 98 17-100 miles), including sidings, stations, warehouses, shops and shop machinery, telegraph lines, canal equipment, etc., etc.		558,787,686.21
Other Assets.		
By cost of bonds of railroad corporations		\$30,467,892.07
By cost of capital stocks of railroad corporations		27,008,880.92
Cost of bonds and stocks of municipal corporations, coal companies, can companies and bridge companies, and investments not otherwise enumerated		9,103,728.74
Total cost of bonds and stocks belonging to the company.		\$96,570,510.73
By managers of trust created by Pennsylvania Railroad Company, Oct. 9, 1878.		100,000.00
By insurance fund		10,000.00
By mortgages and ground rents, receivable		133,905.00
By amount expended for the purchase of anthracite coal lands, Hazleton, Hamilton, Eastwick and other tracts		792,006.86
By appraised value of securities owned by the United New Jersey Railroad & Canal Company, and transferred with the lease of the works of that company		3,780,754.53
By equipment of road and canal owned by the United New Jersey Railroad & Canal Company, and transferred with the lease of the works of that company		157,725.00
By amount of fuel and materials on hand for repairs to locomotives, cars and maintenance of way, viz.:		
For the Pennsylvania Railroad		\$998,447.24
For United New Jersey Railroad & Canal		497,513.16
For Philadelphia & Erie Railroad		194,372.68
		1,090,033.08
By amount of bills and accounts receivable, and amounts due from other roads, including advances made to railroad corporations for construction and purchase of equipment used on their lines, viz:		
Philadelphia & Erie Railroad Company		\$317,454.53
United New Jersey Railroad & Canal Company, construction		218,445.17
slaking fund and redemption account		786,890.00
United New Jersey Railroad & Canal Company, real estate		303,382.89
Other companies		5,542,824.32
		7,258,866.91
By cash balance in hands of the Joint Stock Bank, London, and other parties to pay coupons due in January, 1879		1,180,955.94
By cash balance in hands of freight and passenger agents		\$1,505,760.92
By cash balance in hands of treasurer		1,257,771.71
		2,823,538.63
Less amount of decrease		
Total amount of increase		
		\$147,130,062.49
		\$2,243,455.11
		\$1,066,077.32
		\$577,377.79